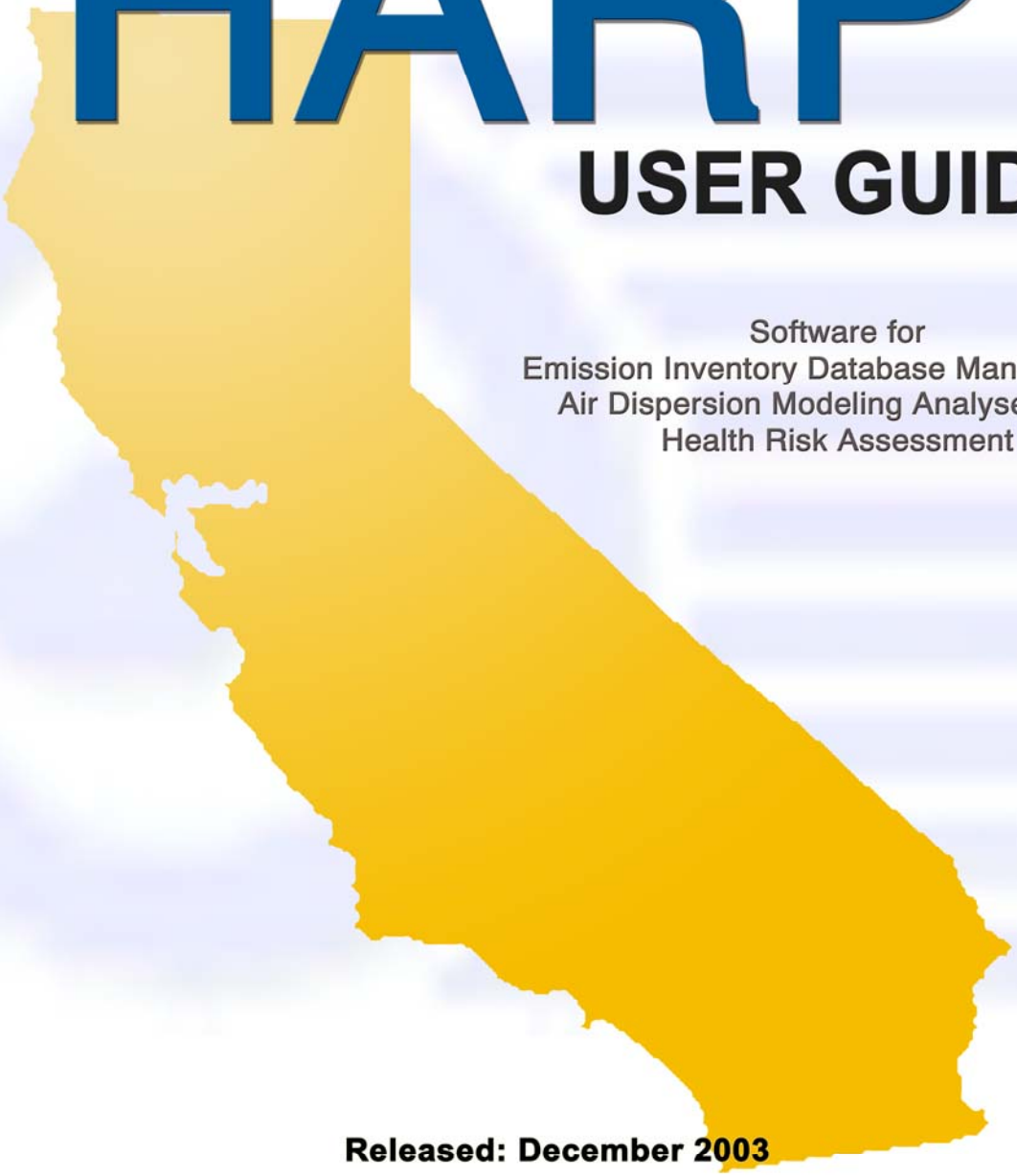
HARP

USER GUIDE

Software for
Emission Inventory Database Management,
Air Dispersion Modeling Analyses, and
Health Risk Assessment



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California Environmental Protection Agency

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State of California
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HotSpots Analysis and Reporting Program User Guide

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Chapter 1 Table of Contents

1. Introduction

What is HARP?

The Hotspots Analysis and Reporting Program (HARP) is a tool that assists with the programmatic requirements of the Air Toxics "Hot Spots" Program. HARP is a computer software package that combines the tools of emission inventory database, facility prioritization, air dispersion modeling, and risk assessment analysis. All of these tools are tied to a single database allowing information to be shared and utilized.

Users of the HARP software should have a working knowledge of air dispersion modeling, the Air Resources Boards (ARB's) Emission Inventory Criteria and Guidelines, and the risk assessment methods and procedures outlined in the Office of Environmental Health Hazard Assessment's document *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* (OEHHA, 2003). This document is referred to throughout this manual as the "OEHHA Guidance Manual".

HARP can be used by Air Pollution Control and Air Quality Management Districts (districts), facility operators, and other parties to manage and evaluate emissions inventory data and the potential health impacts associated these emissions. The use of HARP promotes statewide consistency, increases the efficiency of evaluating potential health impacts, and provides a cost-effective tool for developing facility health risk assessments.

The HARP software may be used to assess the potential health impacts from a single facility or multiple facilities in (close) proximity to each other, where a single meteorological data set is appropriate for all the included facilities. However, other applications may be appropriate depending on the user's expertise and presence of adequate data.

Although designed to meet the programmatic requirements of the Hot Spots Program, the HARP software may be used for preparing risk assessments for other air related programs (e.g., air toxic control measure development, facility permitting applications). Therefore, each user of the HARP software should know the requirements of the regulation or program they are addressing before using the HARP software and reporting results.

1.2 What is the Air Toxics "Hot Spots" Program?

The Air Toxics "Hot Spots" Information and Assessment Act (AB 2588, 1987) was enacted in September 1987. Under this Act, stationary source facilities are required to report the types and quantities of certain substances their facilities routinely release into the air. Emissions of interest are those that result from the routine operation of a facility or that are predictable, including but not limited to continuous and intermittent releases and process upsets.

The goals of the Air Toxics "Hot Spots" Act are to collect emissions data, to identify facilities having localized impacts, to ascertain health risks, and to notify nearby residents of significant risks. In September 1992, the "Hot Spots" Act was amended by Senate Bill

(SB) 1731 to address the reduction of significant risks. The bill requires that owners of significant-risk facilities reduce their risks below the level of significance.

The Act requires that toxic air emissions from stationary source facilities be quantified and compiled into an inventory according to criteria and guidelines developed by the Air Resources Board (ARB), that each facility be prioritized to determine whether a risk assessment must be conducted, that the risk assessments be conducted according to methods developed by the Office of Environmental Health Hazard Assessment (OEHHA), that the public be notified of significant risks posed by nearby facilities, and that emissions which result in a significant risk be reduced. Since the amendment of the statute in 1992 by enactment of SB 1731, facilities that pose potentially significant health risks to the public are required to reduce their risks, thereby reducing the near-source exposure of Californians to toxic air pollutants. Owners of facilities found to pose significant risks by a district must prepare and implement risk reduction audits and plans within 6 months of the determination.

For more information on the Air Toxics "Hot Spots" Program, please visit ARB's website at http://www.arb.ca.gov/ab2588/ab2588.htm.

1.3 What can HARP do?

HARP is an integrated software package that will:

- Create and manage facility emission inventory databases. These databases can be transmitted to the local air districts and the ARB;
- Calculate facility prioritization scores;
- Perform atmospheric dispersion analyses using screening or representative meteorology on one or multiple facilities using the U.S. Environmental Protection Agency's atmospheric modeling software ISCST3 and BPIP;
- Calculate cancer and noncancer (acute and chronic) health impacts using the new risk assessment guidelines *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (August 2003)* developed by OEHHA;
- Use point estimates or data distributions of exposures to calculate inhalation and multipathway risks;
- Perform stochastic health risk analyses;
- Calculate potential health effects for individual receptors;
- Calculate population exposures;
- Calculate cumulative impacts for one or multiple facilities and one or multiple pollutants;
- Calculate potential health effects using a ground level concentration;
- Present the results as tabular reports and onscreen maps with contours. The results can be printed, added to word processing documents, or off-ramped to a Geographic Information Systems (GIS) program.

1.4 Tips on learning HARP

- How To Guides: The user manual contains walkthrough guides providing the basic steps for performing specific tasks, such as conducting a risk assessment. A set of these guides is available in Appendix A.
- Getting help in HARP: HARP contains a help file, which is essentially an electronic version of the user manual. The help file may be accessed through the *Help* menu option of HARP. Information may be looked up using the integrated table of contents, index, or search engine of the Help Viewer.
- Contacting ARB: If you need to contact the ARB for technical support, please send an email to harp@arb.ca.gov or call the Stationary Source Division, Emission Assessment Branch at (916) 323-4327 and tell the receptionist you need assistance with HARP or by. You can also visit the ARB website at http://www.arb.ca.gov/toxics/toxics.htm for more information on HARP and the regulatory guidelines that it is based on.

1.5 How is the user manual organized?

This manual was designed as a step-by-step instructional guide for users of HARP. The manual consists of the following parts:

- Chapters 1 through 3 provide a basic understanding of HARP;
- Chapter 4 provides a tutorial of how to use HARP; and
- Chapters 5 through 11 provide detailed discussions on the functions available in HARP.

Chapter 2 Table of Contents

2. Installing HARP

If you need technical support, please contact the Air Resources Board's Stationary Source Division, Emission Assessment Branch at (916) 323-4327 or send an email to harp@arb.ca.gov.

2.1 System Requirements

HARP will run on Windows 98, NT 4, 2000, or XP. Before installing HARP on your computer, please review the system requirements.

- 128 MB RAM (Recommended)
- CD-ROM (For CD Installation Only)
- 250 MB of Free Hard Drive Space

2.2 CD Installation

- To install HARP, insert the **HARP Installation CD** into the CD-ROM drive (typically the D: drive).
- Double-click the **My Computer** icon located on your Windows desktop. A window will appear showing a list of drives attached to your computer.
- Double-click on the **CD-ROM drive** loaded with the installation CD and then double-click on the folder named **HARP**. The window should show the contents of the HARP installation CD (Table 1).
- Double-click on the folder named **Installation.**
- To begin the setup program, double-click on **HARPSetupxxxxxx.exe, where xxxxxx is the version number**. Then follow the on-screen instructions to complete the setup.

Note: During the installation process, you will be prompted to create a backup directory. The backup directory will contain any files that were replaced during the installation process. It is recommended that you do this.

Table 1. HARP Installation CD Contents

Directory	Description
HARP\Installation	Contains the installation program for HARP. Run this program to install HARP on your machine.
HARP\HARPMaps	Contains street maps for all counties on California in three different coordinate systems and datums (UTM NAD27, UTM NAD83, Teale-Albers)
HARP\References	Contains manuals for ISC and BPIP in PDF format. You must use Acrobat reader to view these files.
HARP\UserManual	The User Manual for HARP in PDF format.
HARP\Meteorology	Contains meteorology data for selected locations.

2.3 Internet Download Installation

- For the ease of downloading, a compact version of the HARP installation file is available on the Internet. This version installs the full working program but excludes the census and street map files. These files are essential to some functions of HARP and will need to be downloaded separately. Please follow the online instructions for complete details on how to download the HARP installation software.
- Once the installation file (HARPSetup.exe) has been downloaded and saved to your hard drive, double-click on it to begin the setup program.
- Follow the on-screen instruction to complete the setup.
- After HARP is installed on your computer, download and save the census data file to the HARP directory on your C: drive (C:\HARP).

2.4 HARP Street Map Files

HARP can generate risk and elevation contours that can be automatically overlaid on a street map. A complete set of street maps for the state of California is included on the HARP installation CD. These maps are also available from the HARP website. Please select the appropriate map for your county and save it to the HARP directory on you C: drive (C:\HARP).

2.5 Desktop Icon

After HARP is installed on your computer, an icon will be added the Windows desktop allowing quick access to HARP. This icon may be deleted or moved to the Windows taskbar or start menu.

2.6 Starting HARP

To begin running HARP, double click on the harp-shaped icon on your desktop.

2.7 Upgrading from CEIDARS-Lite (Version 11.10 only)

CEIDARS-Lite is a component of a much larger software package called HARP and was designed to electronically submit criteria and toxic emission inventory data under the California Air Toxics "Hot Spots" Program. CEIDARS-Lite was pre-released to assist with the needs of facility operators and local air district staff while the other components of HARP were in development. With the release of HARP, CEIDARS-Lite has now been integrated into the HARP program and will no longer be maintained as a separate program. This section describes how to convert the CEIDARS-Lite database file into a format HARP will recognize.

If you have previously installed CEIDARS-Lite on your computer and want to convert the database file to a format HARP will recognize, you must first install HARP using the installation instructions located in the sections above. Please note that for this type of installation, make sure to install HARP to the same directory as CEIDARS-Lite (typically C:\HARP). Once you have successfully installed HARP, make sure that your previous database is opened. HARP will typically do this automatically, but you may also open it manually by selecting File/Open Database from the main menu and browsing to your database file. You can check which database is currently open at any time by selecting Help/Database Info from the menu. At this time, HARP will prompt you that the file format is outdated. To convert the database file, select ***Utilities/Upgrades/Upgrade Database*** from the HARP main menu. A message box will popup and display the database file to be converted and the new file name for the converted database file. Click on ***OK*** on the message box to start the database file conversion. HARP will prompt you when it has finished converting your database file. Please note that you must open the new database file in order to use it.

2.8 Future Software Updates

Future updates to HARP will be available via the Internet at the HARP website. To receive automatic email notifications for the latest software updates, sign up for the HARP list serve at http://www.arb.ca.gov/toxics/harp/harp.htm.

Chapter 3 Table of Contents

3. Getting Familiar with HARP

Before using HARP, it will be helpful to know a little about how HARP is organized. HARP combines the tools of database management, emissions inventory, facility prioritization, air dispersion modeling, and health risk analysis into a single computer software package. All of these tools are tied to a database allowing information to be shared and utilized (Figure 3.1).

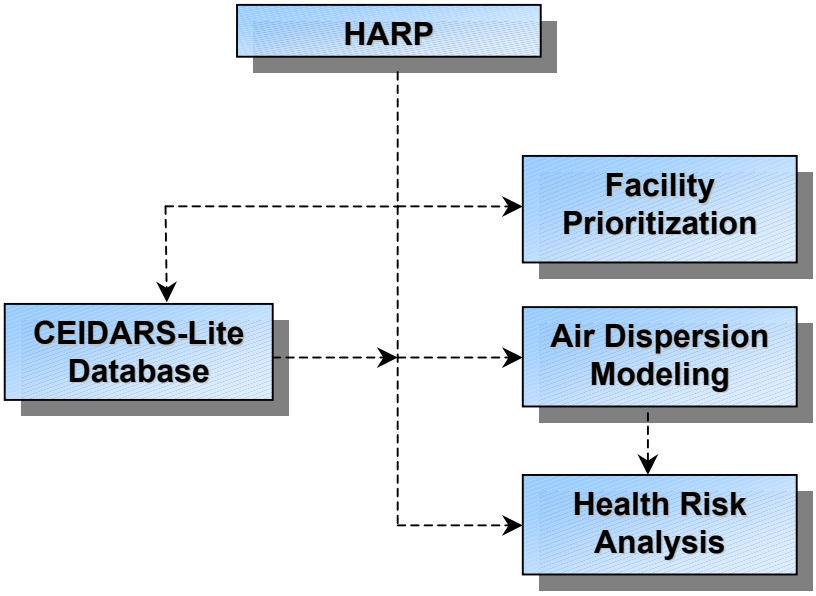


Figure 3.1 Organization of HARP. The flowchart shows how HARP is organized. Facility, emissions, and receptor information is stored in the CEIDARS-Lite database which is accessed by the analysis tools to perform air dispersion and health risk analyses.

3.1 The CEIDARS-Lite Database

The main component of HARP is the CEIDARS-Lite database from which all analysis tools are connected. The database is called CEIDARS-Lite due to its similarity to CEIDARS II, a database developed by the ARB used to track statewide pollutant emissions. CEIDARS-Lite can be used by facility operators and local air pollution control and air quality management district (district) staff to organize and manage criteria and toxics emissions data from facilities. The database can be exported to submit emissions inventory data directly to either the local air district or to the Air Resources Board (ARB). Unlike CEIDARS II, the CEIDARS-Lite database includes additional tables containing data necessary for air dispersion and health risk analysis.

3.2 Facility Prioritization

The Air Toxics "Hot Spots" Information and Assessment Act requires local air districts to prioritize facilities to determine which facilities must perform a health risk assessment. These calculations are done according to the *Air Toxics "Hot Spots" Program, Facility Prioritization Guidelines (July 1990)* developed by the California Air Pollution Control Officers Association (CAPCOA). HARP calculates facility prioritization scores according to these guidelines.

Air Dispersion Analysis

The third component of HARP is the air dispersion analysis tool. This feature allows you to easily utilize facility and receptor data from the CEIDARS-Lite database to build the air dispersion analysis input file and perform the air dispersion analysis.

3.4 Health Risk Analysis

The last component of HARP is the risk analysis tool. This portion of the program performs health risk analyses, which follow *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* (August 2003) developed by OEHHA. The risk analysis tool integrates the CEIDARS-Lite database and the results of air dispersion analysis so that the risk functions can be performed within the same program. The results of the risk analysis may be displayed in a table and as risk contours. The risk contours may be overlaid on street maps, which are derived from U.S. Census Bureau Tiger files. A complete set of street maps for the state of California is included on the HARP installation CD and on the HARP website.

3.5 Using the HARP Main Menu

When you start HARP, the HARP main menu window will appear on your Windows desktop (Figure 3.2). From this menu, you can access all functions of HARP. A brief description of each of the main menu options is provided in Table 3.1.

Figure 3.2 The HARP Main Menu. The menu allows access to all functions of HARP.

Table 3.1 HARP Main Menu Options

Menu Option	*Description*
Edit Data	This menu option provides access to the various data entry and editing screens. For the purposes of editing CEIDARS facility emission data you should select the ***Facilities and Emissions*** submenu. For editing district-wide area source emissions select the ***Area Source*** submenu item. For conducting risk assessment analyses, you either select a facility already existing in the database or create a new facility using the ***Facilities and Emissions*** submenu. All facility emissions, building, and property data is accessed through the ***Facilities and Emissions*** submenu. The facility information is arranged in a set of nested windows. Begin with the *Facility Data* window. Then proceed from the *Facility Data* window, to *Device Data* window, to the *Process Data* window, and then to the *Emissions Data* window. The *Stack Data* window is not part of the nested windows. It can be accessed directly from the *Facility Data* Window. The Facility windows were designed to mimic the existing CEIDARS II database. For further information on editing facility emissions see Chapter 5. The ***Sensitive Receptors*** submenu allows you to add or edit sensitive receptor information. Sensitive receptors are used to compute the concentrations of pollutants at specific locations that usually represent some small sensitive population concentration such as a school or hospital, or any location of interest. The ***Open Database*** submenu allows you to open the default CEIDARS-Lite database or any other HARP database you create.
Reports	This menu option provides access to several different reports, which are generated from data that exists in the database. Each report can be viewed on the screen or sent to a printer. For further details on each of the reporting functions refer to Chapter 6.
Transactions	This menu option provides access to the transaction import and export functions. The transaction export function allows the export of data from the database to a transaction file in a format that can be read by the CEIDARS II.5 system at ARB. The transaction import function allows you to import data from a transaction file that has been prepared by ARB or anyone else running HARP. For further details on transaction export and import refer to Chapter 7.
Analysis	This menu option provides access to the air dispersion and health risk analysis functions.
Project	This menu option will open or create a new project directory in HARP. A project directory tells HARP where to save all of the files that it will create during the air dispersion and risk analyses.
Utilities	This menu includes several miscellaneous utilities. The most important of these is the ***Multi-year*** submenu option, which provides functions for selecting or changing the reporting year and copying data from one year to another. For further details on using the Multi-year options refer to section 5.3.
Help	Select this menu option provides helpful assistance to HARP.
Exit	Select this menu option to exit the program.

Chapter 4 Table of Contents

4. Tutorial

4.1 How to Use this Tutorial

This tutorial should be used sequentially while running the HARP program. The tutorial will lead you through most of the common steps involved in doing a complete end-to-end risk analysis, which includes entering emissions data, running an air dispersion analysis, and finally doing both point estimate and stochastic risk analysis. The steps will be described in a sequence that an analyst might typically follow. As you become more familiar with the features and capabilities of the program, it is certain that you will divert from this sequence. This tutorial will not cover every aspect of the analysis options, but will refer to other sections of the documentation where appropriate to cover some details. The goal is to "hold the hand" of the beginning user so that he/she might attain some comfort level with the program in a short period of time and will see how the many facets of HARP relate to one another.

In order to minimize the human error factor while working through this tutorial, all of the data required for the dispersion and risk analysis portions of the tutorial have been predefined and installed by the HARP installation program into the directory *\HARP\Projects\Demo*. (For installation requirements, please see Chapter 2.) You will nevertheless be led through the data entry procedure. If you should encounter problems during the data entry, enter the data incorrectly, or simply wish to skip the data entry portions of the tutorial, you may utilize the sample data for the analysis steps.

The tutorial consists of actions that the user should carry out, key points of interest, and explanatory text. The actions and key points are always outlined with a box as shown below:

- ➢ This is a user action.
- o This is an explanatory note or program response.

Please follow the tutorial steps sequentially, starting with the next section.

4.2 Track 1 - Getting Started

4.2.1 Installation Requirements

For instructions on installing HARP, please refer to Chapter 2.

4.2.2 Sample Data Installed

When HARP is installed, the installation program creates a directory that contains a database that is already populated with some fictitious data that are intended to be used with this tutorial for demonstration purposes. The directory containing all of the required files for this tutorial is the *\HARP\Projects\Demo* directory. (We have assumed that you have accepted the default name of HARP for the installation directory when you ran the setup). If you have deleted this directory or altered its contents, the tutorial may not work according to the description in this document. You can always restore the original tutorial data by reinstalling HARP.

4.2.3 Files Located in the demo Directory

The following files are included in the demo directory. For a more detailed description of the files that are used or created by HARP see Appendix B.

DEMO.ISC	ISC workbook file; stores all of the ISC input parameters that you can edit
DEMO.INP	ISC input file; generated by HARP when you set up and run ISC
DEMO.OUT	ISC output file; generated by ISC
DEMO.BIN	ISC binary output file; holds X/Q data for each hour
DEMO.ERR	list of error messages generated by ISC
DEMO.SRC	source receptor file; contains list of sources and receptors for the ISC run; generated by HARP when you set up ISC
DEMO.RSK	point estimate risk values generated by HARP; this file is updated automatically each time you perform one of the point estimate risk analysis functions.
DEMO.XOQ	average and maximum X/Q values for each source-receptor combination; generated by ISC
DEMO.PLT	plot file generated by ISC

4.2.4 Running HARP

When you install HARP, the installation program will create a HARP icon on your Windows desktop.

- To run HARP, simply double-click on the HARP icon on the Windows desktop.

As HARP opens, a small dialog window will appear asking you to enter your initials. Whatever you enter here will appear on some of the reports to identify who created the report. Note that the initials are three characters in length and can either be in lower or upper case.

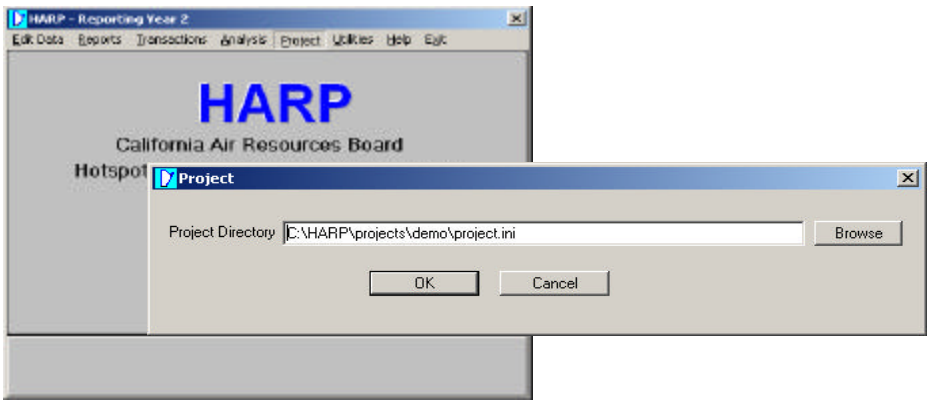
4.3 Track 2 – Program and File Organization

4.3.1 Starting a New Project

A project directory is the location where HARP will save all of the files that will be created when performing a dispersion and risk analysis. You are encouraged to create a new project directory when your attention is shifted to a different facility or geographical area in order to keep the files segregated from other projects. You are not forced to do this, but it is intended to improve organization of your files when you are working on multiple projects.

HARP will place a file named *Project.ini* in each project directory. HARP uses this file to store information about your project, such as the name of the database file that you want to use when working on this project. *Project.ini* is always located in the project directory. You do not

have to create the file *project.ini* in advance. If the file does not exist, HARP will create it when you open a new project directory. The file *project.ini* is an ASCII file that can be viewed or edited with any text editor.



Before you begin a new project in HARP, it is best to create a new directory outside of HARP using Windows Explorer. This new directory is where HARP will save all of the files for your project. To create a new file directory:

- Open the Windows Explorer window (press the **Start** button, select **Programs/Accessories/Windows Explorer**).
- Click on the HARP/PROJECTS directory.
- Select ***Files/New/Folder*** to add a new folder to this directory.
- Right click on the new folder and select ***Rename***.
- Enter *MyProject* (or any other directory name that you prefer).
  - **Note: Never use spaces when naming a file or directory.**
- Return to the HARP main window.
- Select the ***Project*** menu.
- Press the ***Browse*** button.
- Browse to the *MyProject* directory that you just created. (If there is an existing file named *project.ini* select it.)
- Click the ***Open*** button.
- On the project window, click the ***OK*** button.
  - The current project directory has now been changed to *MyProject*. HARP will create a file called *project.ini* and save it in the new directory.
  - Note that when you start a new project, the reporting year always reverts to year -2. So you should change it to the year that you want, as in section 4.3.3.

4.3.2 Opening the demo database

The HARP (CEIDARS-Lite) database file will accept data for facilities and their emissions, area wide (regional) sources, and sensitive receptors. The facility and emissions database is patterned after the Air Resources Board's (ARB) California Emission Inventory Development and Reporting System (CEIDARS) emission inventory reporting forms. During an analysis, the dispersion and risk modules will pull data from the HARP database to perform the required calculations.

The HARP database only comes with example data for the tutorial. Data for your project will need to be added by you to the HARP database. By default, when you first install and run HARP the database file that is opened will be HARP.MDB which will exist in your HARP directory. But just in case you have changed it by opening up a different database, here is how you would get back to the original installed database.

The HARP (CEIDARS-Lite) database that you create will normally contain facility and emissions data for numerous facilities, and will therefore probably span multiple projects. It is not necessary to make a copy of HARP.MDB for each project (but each project should have a different reporting year). The location of the database file is independent of the location of the project directory.

If you want to skip the data entry portions of this tutorial you can use the data in year -2 of the HARP.MDB database and skip directly to the dispersion and risk analysis portions of the tutorial.

- From the HARP main menu, select ***Edit Data/Open Database***.
- When the ***File Open*** dialog window appears, browse to the HARP directory and select *HARP.MDB*.
- Each time you run HARP, it will automatically open the last database file and reporting year that you selected.
- The database file can be placed in any directory independently of where your project directory is located. Use the steps above to open a database in a different directory.
- You may make a copy of the database file by using the Windows Explorer or other file manager program. Copies can be used for backup, for specific projects, or to experiment with program features without concern for altering original data.

4.3.3 Select Reporting Year

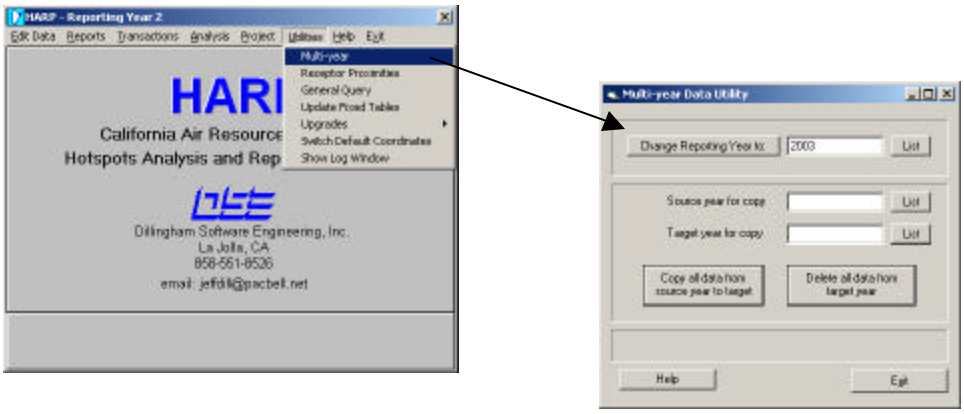
All facility and emissions data is keyed to a specific reporting year. Data for each reporting year is separate and independent. All editing, reporting and analysis is done for the reporting year that is currently selected.

The reporting year that you specify is normally intended to represent the actual calendar year in which the emissions data was reported (e.g. 2003). However, you may use any reporting

year as a scratch area in order to experiment with the program or to setup for various projects. HARP will accept any number between -32767 and +32767 as a reporting year. However, any year with a negative number may be overwritten when the program is updated. In this tutorial, the example data is stored in reporting year -2.

Data for this example will be entered into a new, empty reporting year:

- From the main menu, select ***Muti-year***.
- Select the top list button to show a list of existing reporting years. Decide on a new year that does NOT exist in the list. This example will assume that you have chosen year -4. Press the *Cancel* button to return to the ***Mulit-year*** window.



- Enter 4 in the space next to ***Change reporting year to.***
- Press the button labeled ***Change reporting year to.***
- Note: The year will not change until you press the button ***Change reporting year to.***
- Press the ***Exit*** button.
- The top of the main window should now show reporting year -4.
- Press *Exit* to close the ***Multi-year*** window.

4.3.4 Copying Data in a Reporting Year

You may copy all data from one reporting year to another in one step. You might, for example, wish to copy all of the real data from 2003 to some other year, such as year -3, either to provide a backup copy or to experiment with changing the data.

- From the main menu, select ***Utilities/Multi-year***.
- The ***Multi-year Data Utility*** Window will appear.
- Next to ***Source Year to Copy*** enter -2.
- Next to ***Target Year to Copy***, enter -3.

- ➢ Press the button labeled ***Copy all data from source year to target year***.
- o Year -3 now contains a copy of all of the data from year -2. You may make year -3 the current year by following the steps above.

4.3.5 Deleting Data from a Reporting Year

You may delete all data from any reporting year.

- ➢ From the main menu, select ***Utilities/Multi-year***.
- o The ***Multi-year Data Utility*** Window will appear.
- ➢ Next to ***Target Year to Copy***, enter -3.
- ➢ Press the button labeled ***Delete all data from target year***.
- o You will be prompted for confirmation. When prompted, you must enter the word DELETE in upper case to confirm your intent.
- o The deletion of data using these steps is permanent and cannot be reversed.

4.4 Track 3 - Entering Facility and Emissions Data

This section will walk you through the steps of entering emissions data into the HARP (CEIDARS-Lite) database. Later tutorial tracks will utilize this data for dispersion and risk analysis. If you want to compare results directly with those presented here, you should be careful to enter the same data values. Otherwise, your results will vary.

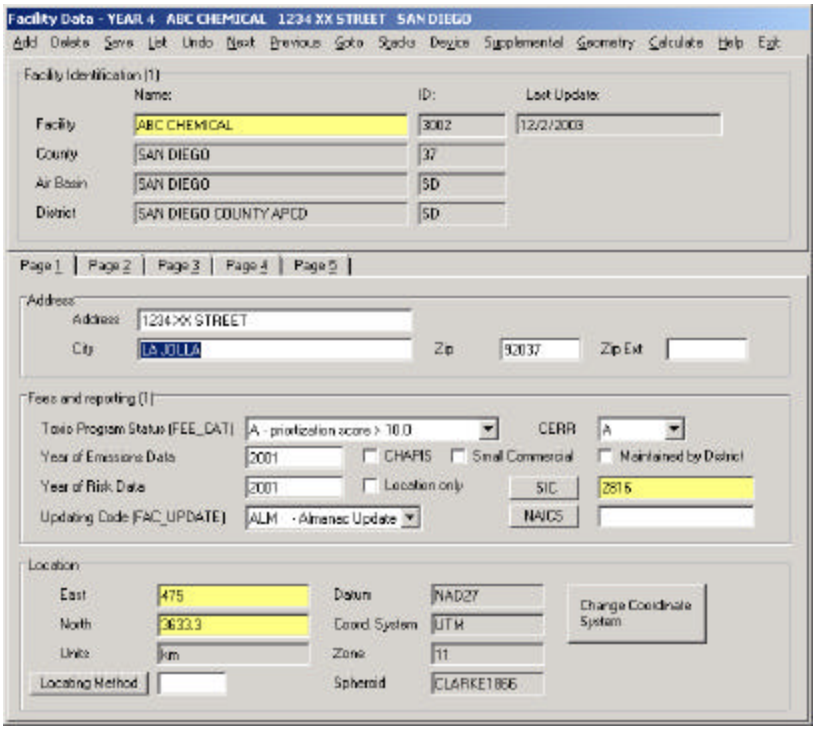
Note: You cannot create a database from scratch. You must copy an existing database and then modify it. But you can create a new inventory year within the existing database. This new inventory year will be empty of data. You can then copy in data from an existing year or hand-enter new data.

4.4.1 Facility Data

The name of the first fictitious company whose emissions data you will be entering is ABC Chemical. It is located in La Jolla, CA.

- ➢ From the main menu, select ***Edit Data/Facilities and Emissions***
- o You will be prompted with the reminder that there is no facility data yet entered for this reporting year. Acknowledge the message by pressing the **OK** button.
- o The ***Facility*** window will appear.
- ➢ Select ***Add*** from the menu.
- o The ***Facility/Add*** window will appear.
- ➢ Enter a ***facility ID*** of 1001

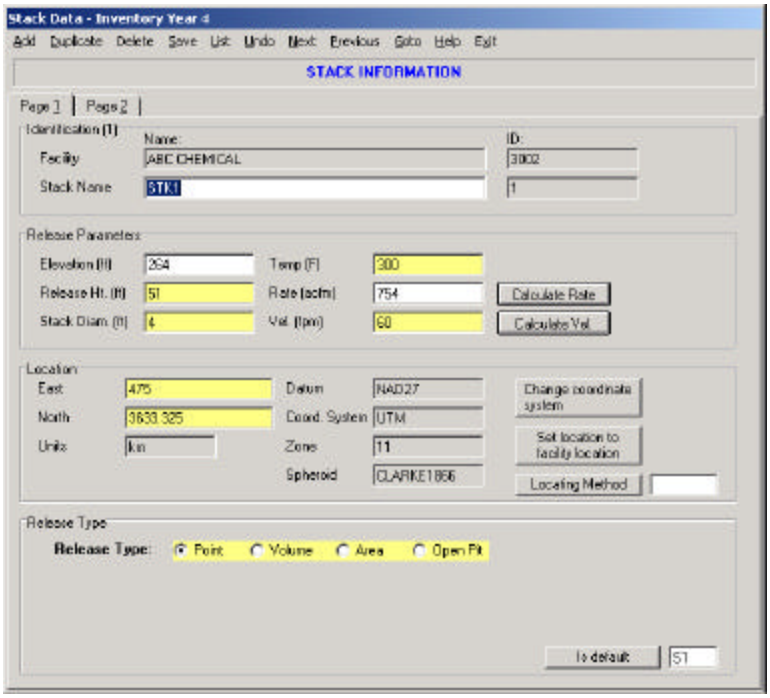
- The facility ID can be any positive integer, up to nine digits that you choose. It must be unique for the county, air basin, district and reporting year that you are considering.
- We assume that you do not know the county, air basin and district codes for San Diego.
- Click the button labeled ***List COABDIS***
- The county selection list appears
- In the box next to the ***Search for String*** button enter *diego*. Then press the ***Search for String*** button.
- There are two San Diego entries listed. Click on the second one, where the air basin is SD (the air basin OCS is the outer continental shelf, i.e. offshore)
- Press the ***OK*** button.
- On the ***Add Facility*** window, press the OK button
- On the ***Facility Data*** window, enter the facility name, 'ABC Chemical'.
- Enter a facility SIC code as shown below, (you may press the ***Facility SIC*** button to select from a list of all SIC numbers. You may search for a specific SIC name in the same way as you just search for the COABDIS above. Try narrowing the search by entering a search string like 'chemicals'.
- For risk assessments, 9999 (unknown) can be added for the SIC code and 99999999 for SCC code.
- Enter the UTM coordinates shown below and then click on the "Change Coordinate System" button to select the coordinate system and datum. In this case, the coordinate system is UTM Zone 11 and the datum is NAD27. Press Accept to go back to the Facilty Data main page.
- Click on Page 2, Page 3, Page 4, and Page 5 tabs and enter any available information.
- Select ***Save*** from the menu. The ***Facility Data*** window should appear as shown below.
- Tip: HARP will not update the facility/boundary drawing until you hit save on the screen where you have made your latest change.
- The remaining fields on this window are required for reporting of emissions to ARB, but are not used for risk analysis. If you do not know the valid entries for a particular field, press the adjacent button for a selection list.



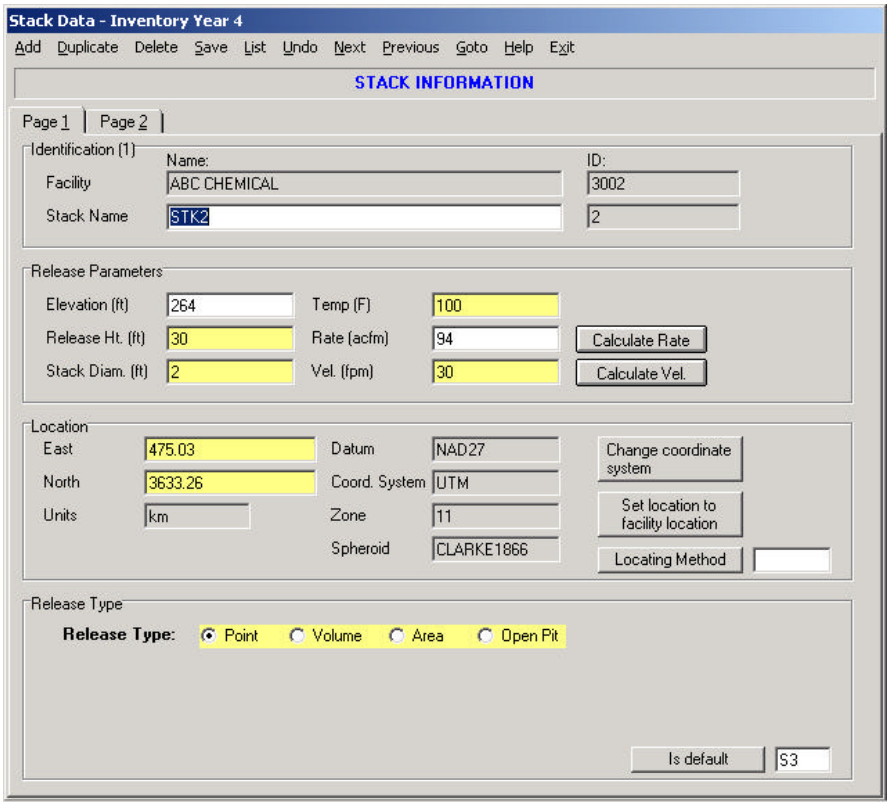
4.4.2 Stack Data

ABC Chemical has two stacks. Note that the term 'stack' is used loosely to refer to a release point. A stack may be either a physical stack, which is termed a point source, or it might be a volume or area source. All of the release types are stored in the same table in the database, which is called the stack table.

- From the ***Facility Data*** window, select **Stacks** from menu.
  - You will be reminded that there is not yet any stack data for this facility. The ***Stack Data*** window will appear.
- Select ***Add*** from the menu.
- Enter a ***Stack ID*** of 1 or any 6 digit positive integer.
  - The ***Stack ID*** must be unique for this facility only.
- Enter the remainder of the parameters as shown in the window below, except for the ***Rate*** field.
  - Note: Elevation in feet refers to the height above sea level of the base of the facility while release height is the high of the stack from the base of the building.



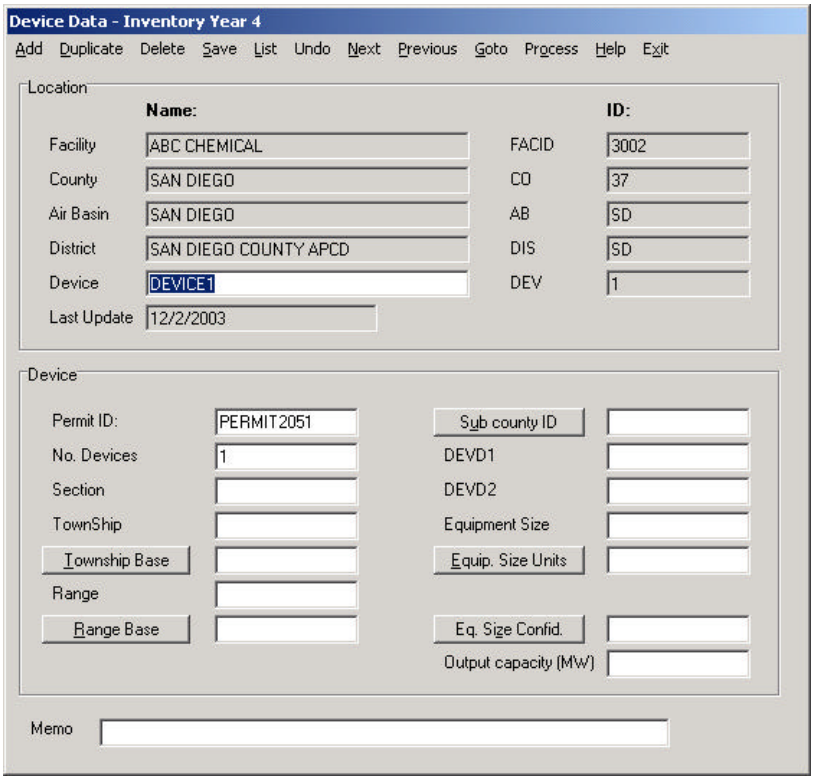
- ➢ Press the button labeled ***Calculate Rate***
- o The flow rate is calculated from stack diameter and velocity, and the calculated value is automatically entered into the ***Rate*** field. Conversely, you could enter the *Rate*, then press the ***Calculate Vel***. button to fill in the flow velocity.
- o To facilitate entering stack coordinate data, users can transfer the facility coordinates into this page by pressing the "Set location to facility location" button.
- ➢ Select ***Save*** from the menu.
- o All of the fields entered above are required for dispersion and/or risk analysis.
- o The release type defaults to ***Point***. For point releases (i.e. stacks), the remaining fields on the bottom of the window are not used. If the release type is not a point type, then you should select the appropriate type and fill in the corresponding data fields as indicated by the captions. A volume source requires a width and height (lateral and vertical dimensions are entered). An area source requires height (a vertical dimension is entered), x-width, y-width and angle. An open pit source requires x-width, y-width, angle and volume of open pit. NOTE: For volume and area sources, the height is divided by the appropriate factor (e.g., 2.15) to obtain the vertical dimension (SZINIT) before input into HARP. The volume source also requires an adjustment to the width to obtain a lateral dimension (SYINIT). To obtain the SYINIT for HARP, the width is divided by a factor (e.g., 4.3). For more information see section 5.10.
- ➢ Enter data for a second stack using the values shown below.
- ➢ Press the ***Exit*** button to return to the ***Facility Data*** window.
- o Tip: HARP will not update the facility/boundary drawing until you hit save on the screen where you have made your latest change.



4.4.3 Device Data

ABC Chemical has a single device.

- ➢ From the ***Facility Data*** window, select ***Device*** from the menu.
- o You will be reminded that there is no device data yet entered for this facility.
- ➢ Select ***Add*** from the ***Device Data*** window.
- ➢ Enter a device ID of 1 or any six digit positive integer.
- ➢ Enter the device name in the box labeled ***Device***.
- ➢ Press ***Save*** to save the device record.
- o The remaining fields on the device window are not required for dispersion or risk analysis. However, they should be filled out for reporting of emissions data to ARB.



4.4.4 Process Data

ABC Chemical has two processes. They are both associated with the same device that was entered above. Each process is emitted through a different stack.

- From the ***Device Data*** window, select *Process* from the menu.
  - You will be reminded that there are no processes data yet entered for this device.
- Select ***Add*** from the ***Process Data*** window.
- Enter a process ID of 1. (This may be any ID that is unique to this device. The process ID must be an integer between 1 and 99).
- Enter the process name in the box labeled *Process*.
- Enter an SIC and SCC codes as shown below. Alternatively, you can click the button labeled *SIC* and select from a list of available SIC codes. Try searching for 'chemicals' or some other embedded string.
  - Note that if you enter the SIC and SCC codes directly by typing them, the corresponding SIC and SCC names are immediately shown in the gray boxes below the SIC and SCC buttons. If you enter an invalid SIC or SCC code, the name fields will appear blank.
  - When you enter a valid SCC code, the SCC units appear automatically in the box labeled ***SCC Units***.

- Please also note that the Reconcile Emission Inventory Code (REIC) is N/A which means there is no corresponding areawide source associated with this SIC/SCC combination. In other words, this stationary point source will not be reconciled with any areawide sources.
- The ARB assigned a number of SIC/SCC combinations in the category table. For any valid combination, there is a corresponding Emission Inventory Code (EIC). However, there may not be a REIC for this combination because it is not reconciled with any areawide source. For example, there is not any areawide source corresponding to hexavalent chromium electroplating process. Thus, SIC/SCC=3471/30901002 does not have any areawide source associated with it.

➢ Enter an average annual process rate of 1000. The units are TONS PRODUCED per year, as implied by the SCC code.

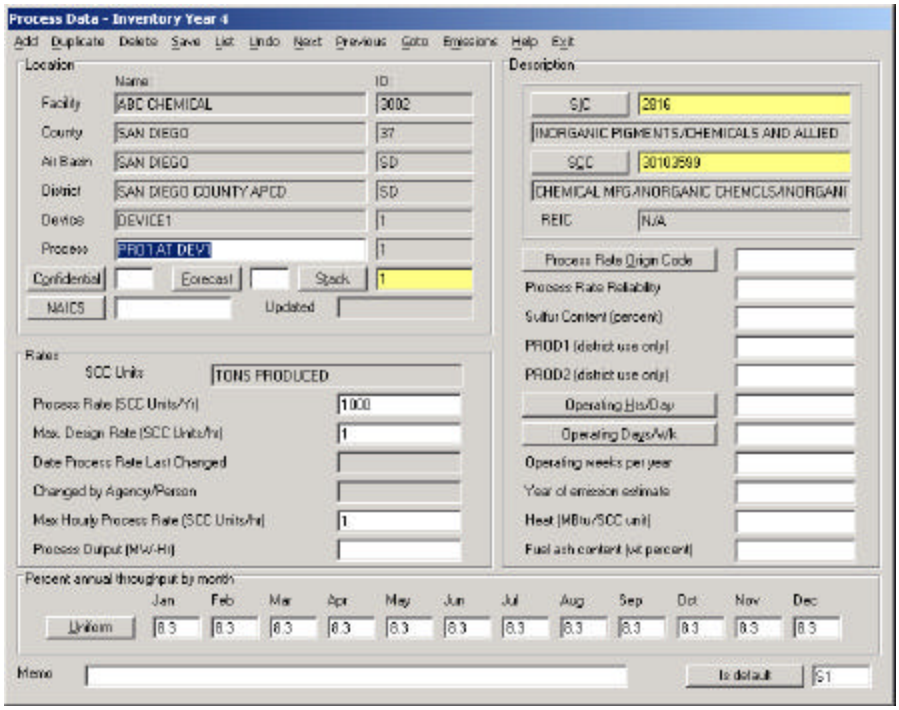
➢ Enter a maximum hourly process rate of 1. The units are TONS PRODUCED per hour, as implied by the SCC code

➢ Enter a stack number of 1. Alternatively, you can click the *Stack* button to select from a list of stacks that are currently defined for this facility.

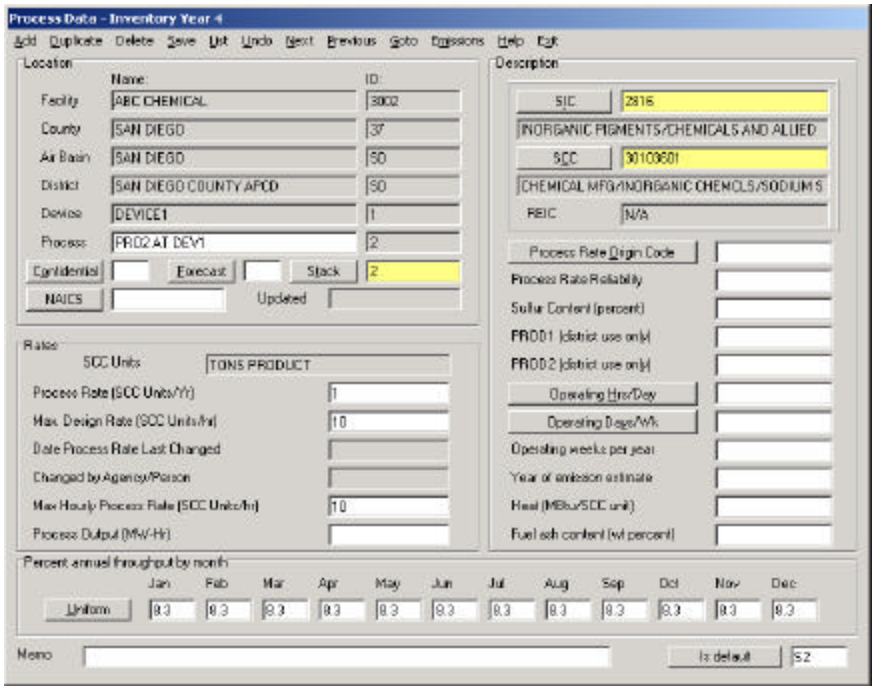
- It is recommended to enter the stack data for the facility first, so that when you get to the process data the stack numbers will already be defined. However, this is not essential. You may enter a number for an undefined stack here, then go back and add the stack from the stack window. If the stack that you enter on the process window is not defined, you will get an error message during the risk analysis when you try to import the chemical and emission data for that stack.

➢ Press ***Save*** to save the process record

- The ***Date Process Rate Last Changed*** field is updated automatically with today's date.
- The remaining fields on the process window are not required for dispersion or risk analysis. However, they should be filled out for reporting of emissions data to ARB.



- Select ***Add*** from the ***Process Data*** window.
- Enter a ***Process ID*** of 2 (This may be any ID that is unique to this device)
- Fill in the rest of the data for process number 2 as shown below
  - To enter the monthly rate distribution for this process, enter the percentage of the total annual process rate attributed to each month in the boxes at the bottom of the window. To specify a uniform distribution, click the button labeled ***Uniform***. This will set the percentage for each month to 8.3. The total of the percentages for the twelve months must add up to 100. (The monthly distribution is not required for dispersion analysis.)
  - Note that this process is associated with stack 2, meaning that all of the emissions from this process are assumed to emit from stack 2.
- Select ***Save*** from the menu.

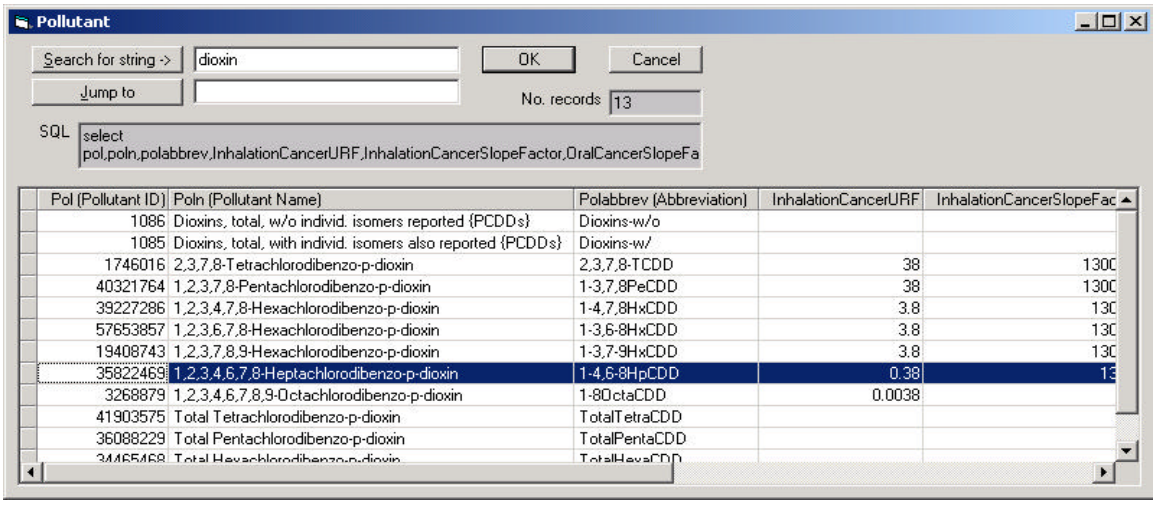


4.4.5 Emissions Data

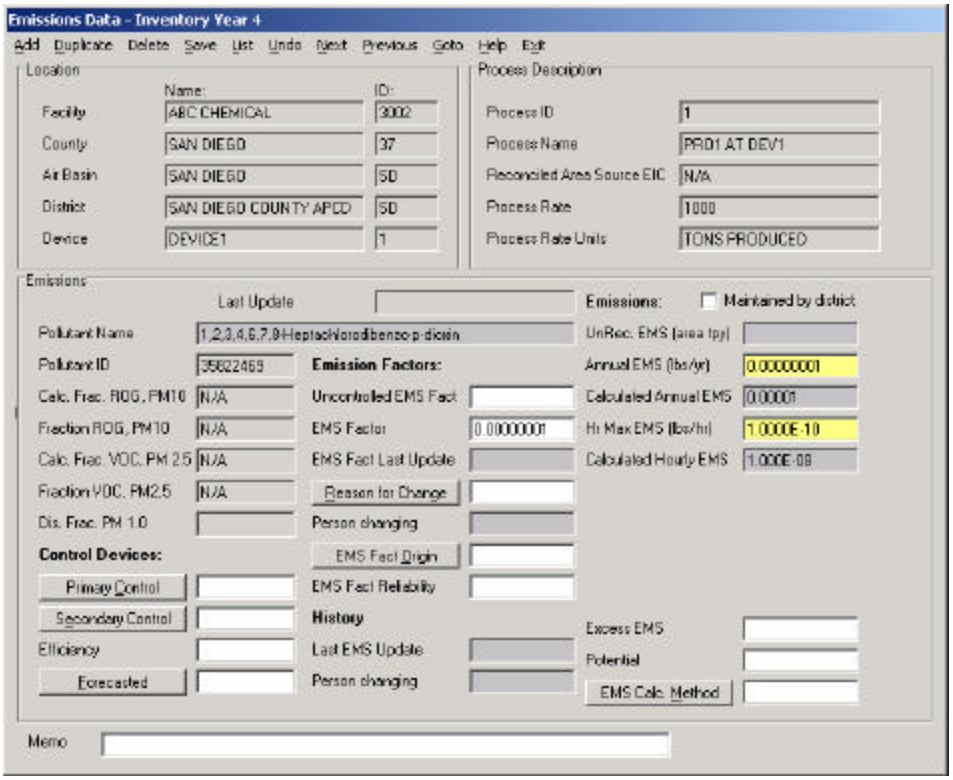
In this section you will enter the emissions data for the two processes defined in the previous section.

- From the ***Process*** window, select *List*. This will display a selection list of all of the processes associated with the current device.
- Double-click on the first process in the list. The *Process* window should now show the data for process 1.
- Select ***Emissions*** from the menu.
  - You will be reminded that there are no emissions records yet defined for this process.
- Select ***Add*** from the ***Emissions Data*** window.
  - The ***Add Pollutant*** window will appear.
- Click the button labeled ***Pollutant ID***. You will see a selection list of pollutants.
  - ***Reminder: Not all of the substances in the database have health values (cancer, chronic, acute). Therefore if you plan on performing a risk analysis, make sure you have chosen the substance with the correct health value. The HARP health table can be viewed from the Risk Analysis module (Analysis/Risk Analysis/Health Table). Pollutant IDs are unique to each substance, except for carbon monoxide which is listed as 42101 (SAROAD for criteria pollutant) and 630080 (CAS number for toxics). You should always select 42101 when entering emissions for carbon monoxide unless you want to perform risk analysis for a facility using carbon monoxide. In this case select 630080 as carbon monoxide.***

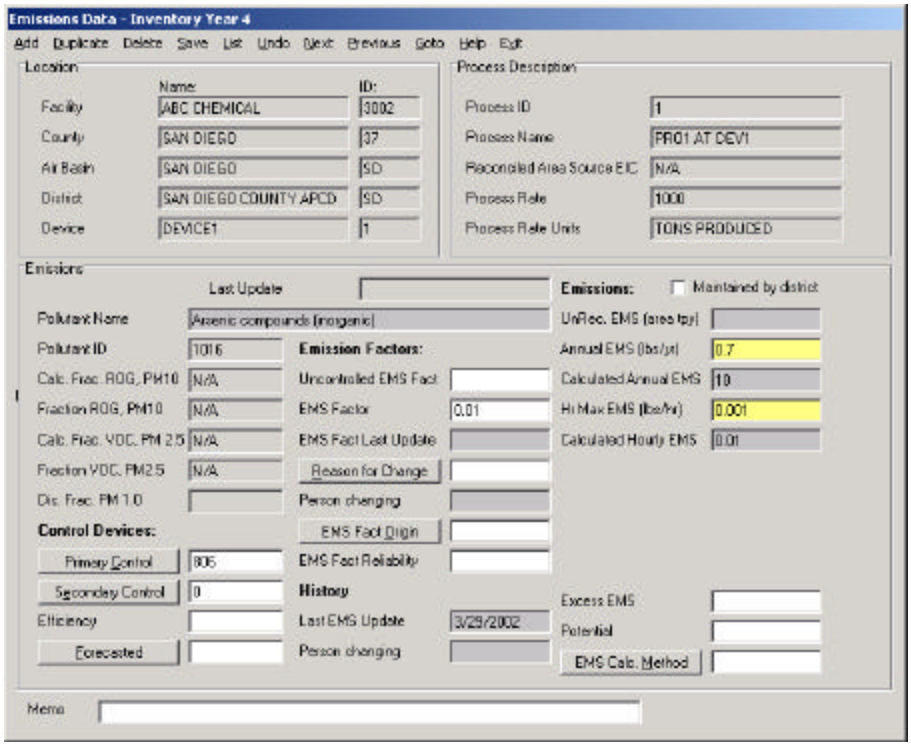
- ➢ In the search box at the top of the window, enter arsenic. Press the ***Search for String*** button.
- o The search list should appear as shown below.



- o You will see a selection list of pollutants.
- ➢ Double-click on 35822469 – 1,2,3,4,5,7,8-Heptacholorodibenzo-*p*-dioxin.
- ➢ Press the *OK* button on the ***Add Pollutant*** window.
- ➢ On the *Emissions Data* window, enter an emission factor as shown below
- o Note that the ***Calculated AnnualEMS*** and ***Calculated Hourly EMS*** are automatically updated. These numbers are the products of the emission factor that you just entered in this window and the corresponding process rates that you entered on the *Process Data* window.
- ➢ Enter annual emissions as shown below.
- o In this case we are ignoring the calculated process rate above, which is only a guideline. This difference will likely be a red flag to the ARB reviewers.
- ➢ Enter ***Hr. Max. EMS*** value as shown below
- ➢ Select ***Save***.
- o The ***Emissions Data*** window should appear as shown below.

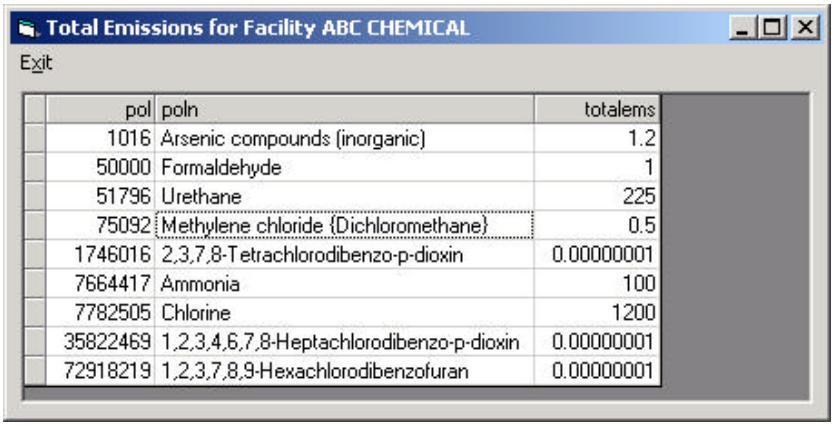


- Select *Exit* to close the ***Emissions Data*** window and return to the ***Process Data*** window.
- Click ***Next*** to go to the second process. The *Process Data* window should show process number 2.
- Select ***Emissions*** from the menu.
  - You will be reminded that there are no emissions records yet defined for this process
- Select ***Add***.
- Select pollutant 1016 - Arsenic compounds (inorganic).
- Enter the rate parameters as shown below.
- Select ***Save***.
  - Note that the fields labeled ***Last EMS Update*** and ***Person Changing*** are updated automatically. The ***Person Updating*** field will contain the name or initials that you entered into the log on window when you first ran HARP.



Perform a quick check of the emissions data to be sure that it agrees with the sample problem.

- Close the ***Emissions Data*** window by selecting ***Exit***.
- Close the ***Process Data*** window by selecting ***Exit***.
- Close the ***Device Data*** window by selecting ***Exit***.
- From the ***Facility Data*** window, select ***Calculations/Emissions***.
  - You should see a ***Total Emissions*** table displayed as shown below. This window tallies up the annual emission rates for all chemicals for all processes associated with the current facility.
- Close the ***Total Emissions*** window by selecting ***Exit***.



pol	poln	totalems
1016	Arsenic compounds (inorganic)	1.2
50000	Formaldehyde	1
51796	Urethane	225
75092	Methylene chloride (Dichloromethane)	0.5
1746016	2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.00000001
7664417	Ammonia	100
7782505	Chlorine	1200
35822469	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.00000001
72918219	1,2,3,7,8,9-Hexachlorodibenzofuran	0.00000001

4.4.6 Building Geometry

Building geometry is used for building downwash calculations when setting up the dispersion analysis. If you do not enter building geometry, then no downwash calculations will be included.

Each facility may have one or more buildings. Each building may have one or more tiers. The use of tiers allows buildings to be described as multiple levels. Typically one tier will be stacked atop another to describe a stepped-in geometry.

Each tier of each building is described by three or more vertex points, which represent the corners of the building, and a tier height. The tier height is measured from the building base elevation, which is the same for all tiers of a particular building.

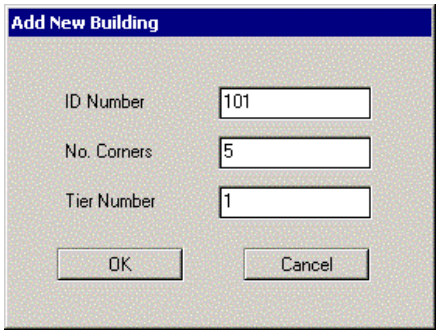
ABC Chemical has three buildings. Two of the buildings have only one tier. The third building has two tiers.

Each vertex is described by its easterly and northerly coordinates, measured relative to the facility location. The facility location for ABC Chemical is UTM coordinates 475,000 meters east and 3,633,000 meters north as entered on the *Facility Data* window. After entering the building and property boundary coordinates, you may shift the location of all buildings and property points by adjusting the facility location.

Begin the exercise by entering the data for the first building as follows.

- From the ***Facility Data*** window, select ***Geometry/Buildings***.
  - The ***Building Geometry*** window appears. The window is blank, indicating that there is not yet any building data entered for this facility.
- Select ***Add*** to add a new building tier.
  - The ***Add New Building*** window appears.
- Enter an ID number for this building of 101.

- Enter a tier number of 1. The tier number is arbitrary, but must be unique for this building.
- Enter 5 for the number of corners. This defines the number of vertices for this tier.
- The ***Add New Building*** window should appear as shown below.



- Press the *OK* button to return to the ***Building Geometry*** window.
- Enter a building description
- Enter a building height of 41 meters
- Select ***Save*** to save the changes you have made thus far.
- Select ***Edit Points*** to edit the vertex point locations.
- The ***Building Boundary Points*** window will appear as shown below.
- Note that the window caption reads 'Building 101 Tier 1' to remind you what tier you are editing.

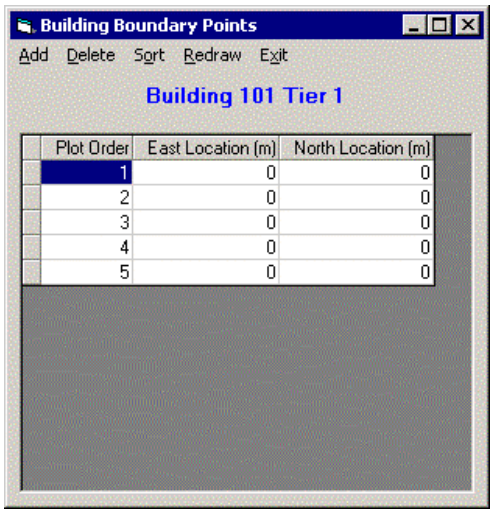
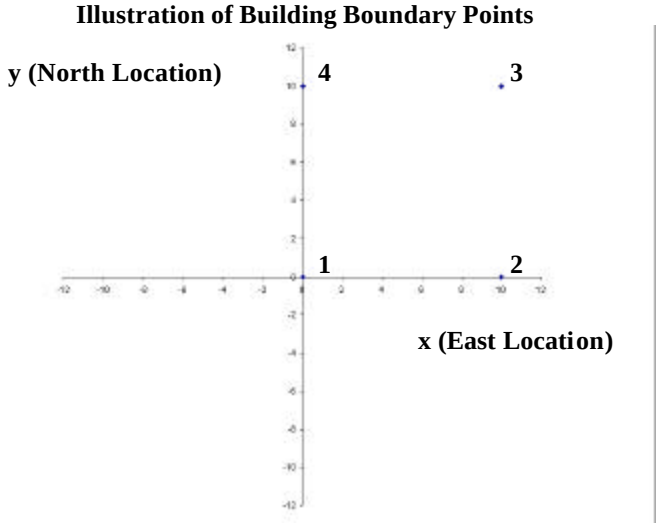


Illustration of Building Boundary Points

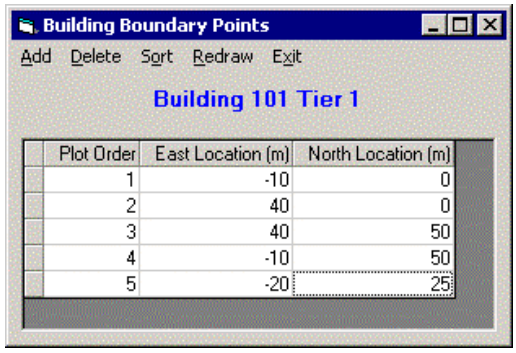


- Position the ***Building Geometry*** window and ***Building Boundary Points*** window on the screen so that both are visible.
- Enter the data as shown below.

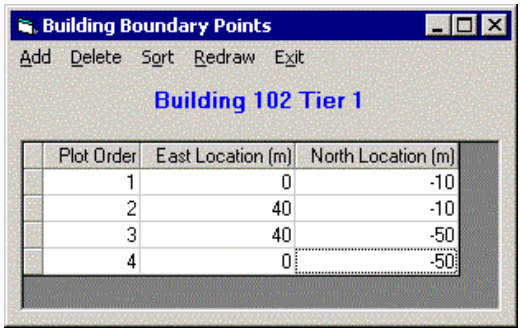
o As you enter the vertex point coordinates, the *Building Geometry* window updates automatically to show the current geometry. If the building drawing does not appear after you have entered all the points, select ***Zoom/Whole Facility*** from the menu.

o The ***Plot Order*** is normally sequential starting from 1. These numbers indicate the order in which the vertices exist physically moving around the building in either the clockwise or counterclockwise direction. You may enter the east and north coordinates of the points in any order as long as you adjust the plot order to correspond to the physical order of the building corners.

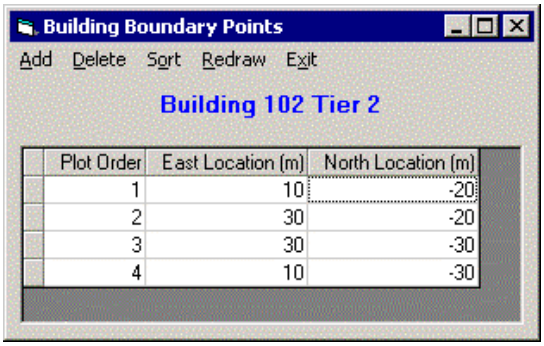
- Select ***Save*** to save the change you have made so far.



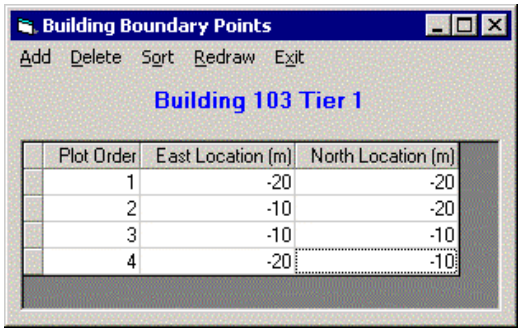
- Select ***Add***.
- Enter building number 102, tier 1.
- Set the number of corners to 4 (the default).
- Enter a building height of 30.
- If the ***Building Boundary Points*** window is not visible, select ***Edit Points***.
- Enter the data as shown below.
- Select ***Save.***



- Select ***Add***.
- Enter building number 102, tier 2.
  - Note that is a second tier of the same building.
- Set the number of corners to 4 (the default).
- Enter a building height of 50.
- If the ***Building Boundary Points*** window is not visible, select ***Edit Points***.
- Enter the data as shown below.
- Select ***Save.***



- Select ***Add***.
- Enter building number 103, tier 1.
- Set the number of corners to 4 (the default).
- Enter a building height of 15.
- Enter the data as shown below.
- Select ***Save***



- Select ***Options/Show Stacks***
  - The ***Building Geometry*** window should now appear as shown below.

- The currently selected building tier is shown in red.
- The stacks are shown as small red circles (solid line). The diameter of the circle is the diameter of the stack.
- The large dotted circle around each stack is merely a visual aid to make it easier to locate the stacks on the map when the map scale is small. The diameter of the dotted circles has no significance.
- As you move the mouse cursor around the graphic portion of the window (without clicking) the coordinates of the cursor are continuously updated. Both the relative coordinates (with respect to the facility location) and the UTM coordinates are shown.
- The horizontal and vertical dotted lines cross at the facility UTM coordinates and are for visual reference.

➢ Select *List* to see a list of all the building tiers defined for this facility.

➢ Double-click on one of the tiers shown in the list.

- The data for the tier that you selected is now displayed, both in the ***Building Geometry*** window and the ***Building Boundary Points*** window. You may edit the values in either window, then remember to select *Save.*

➢ Click the *Next* and ***Previous*** buttons to show the data for each of the tiers in sequence

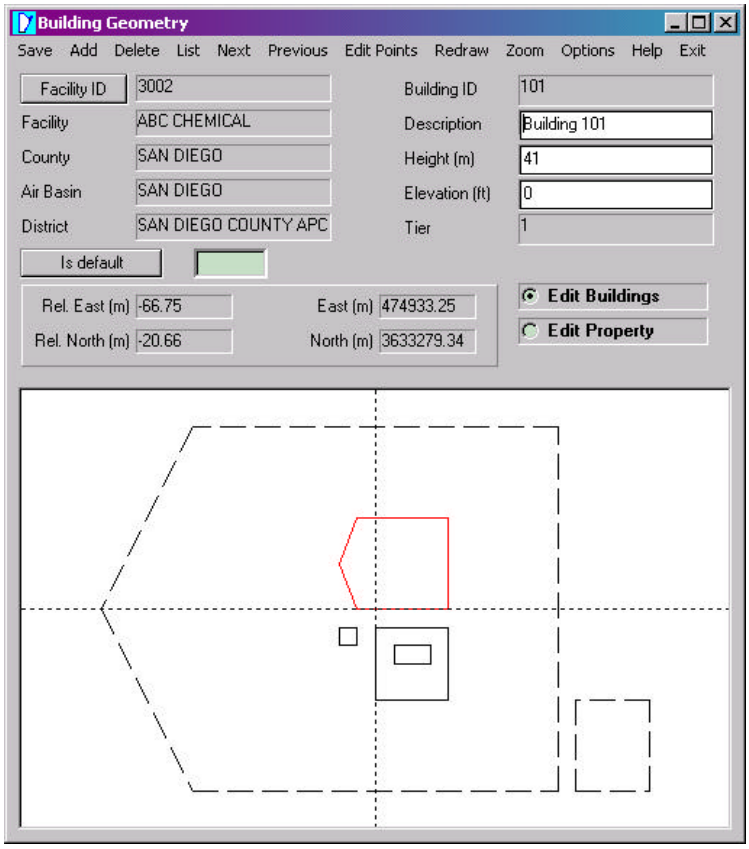
➢ Holding down the left mouse button, drag around an area of the map to zoom in to a larger scale.

➢ Select ***Zoom/Zoom Out*** to show the map on a smaller scale.

➢ Select ***Zoom/Whole Facility*** to set the map scale to show the entire facility

➢ Select ***Zoom/Whole Building*** to set the map scale to show the currently selected building tier.

- To delete the currently selected tier, click ***Delete.*** You will be prompted for confirmation before the tier is deleted.
- In the figure shown below, the property boundaries are also shown. The next section described how to enter property boundary descriptions.
- Tip: HARP will not update the facility/boundary drawing until you hit save on the screen where you have made your latest change.



4.4.7 Property Boundaries

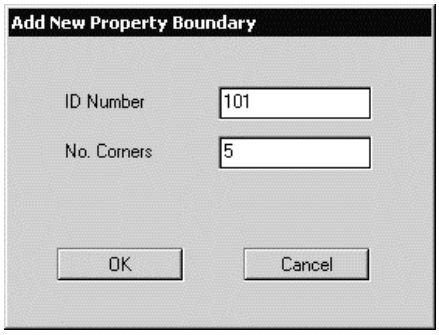
Property boundary data is used to locate boundary receptors for risk analysis. Because the maximum exposed individual (MEI) is often located on or near a property boundary, the normal practice is to place receptors along the property boundary at intervals. This must be done prior to running the dispersion analysis. Once the property boundaries have been identified HARP can be used to generate receptors at regular intervals along the boundary automatically so that you do not have to figure out the UTM coordinates of each boundary receptor.

Each facility may have one or more property boundaries. The boundary curves do not have to be connected. This could be used, for example, to describe a facility having properties on opposite sides of a street.

Each property boundary curve is described by three or more vertex points, which represent the corners of the property line. Each vertex is described by its easterly and northerly coordinates, measured relative to the facility location. After entering the building and property boundary coordinates, you may shift the location of all buildings and property points by adjusting the facility location.

ABC Chemical has two property boundaries. Enter the property boundary geometry as follows.

- From the *Facility Data* window, select ***Geometry/Property Boundaries***.
- The ***Property Boundary Geometry*** window appears. The window shows the building geometry but no property **boundary curves because no property boundary data has yet been entered for this facility.**
- **Select *Add*** to add a new property boundary.
- The ***Add New Property Boundary*** window appears.
- Enter an ID number for this property boundary of 101.
- The property boundary ID numbers are distinct from the building tier ID numbers, but all of the property boundaries for a single facility must have unique IDs.
- Enter 5 for the number of corners. This defines the number of vertices for this boundary.
- The ***Add New Property Boundary*** window should appear as shown below.



- Press the *OK* button to return to the ***Property Boundary Geometry*** window.
- Enter a building description.
- Select ***Edit Points*** to edit the vertex point locations.
- The ***Property Boundary Points*** window will appear.
- In the ***Property Boundary Points*** window enter the coordinates for the property boundary vertices as shown below.
- Note that the window caption reads 'Property Boundary 101' to remind you of which boundary you are editing in case there is more than one boundary associated with this facility.

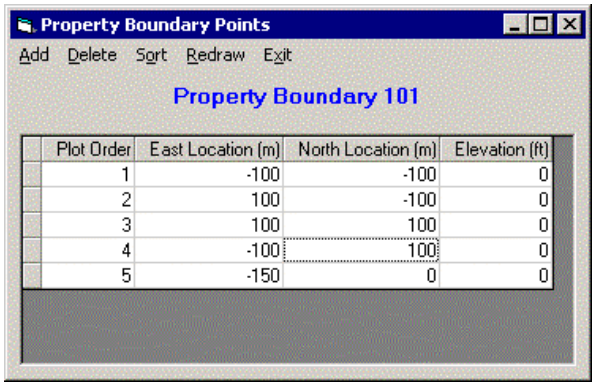
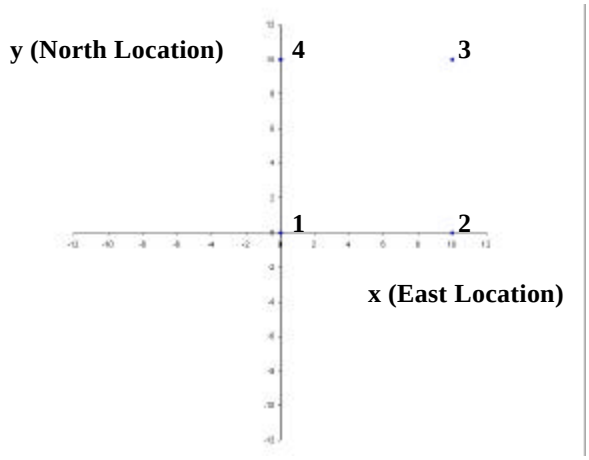
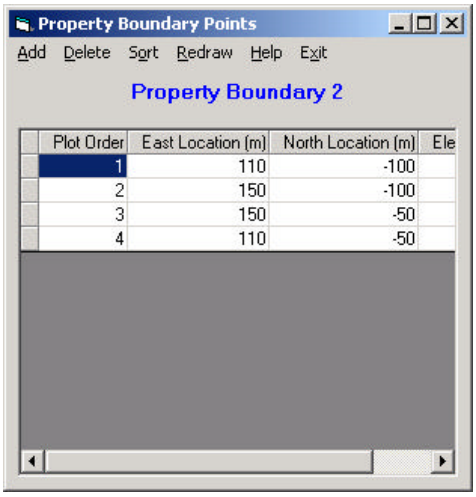
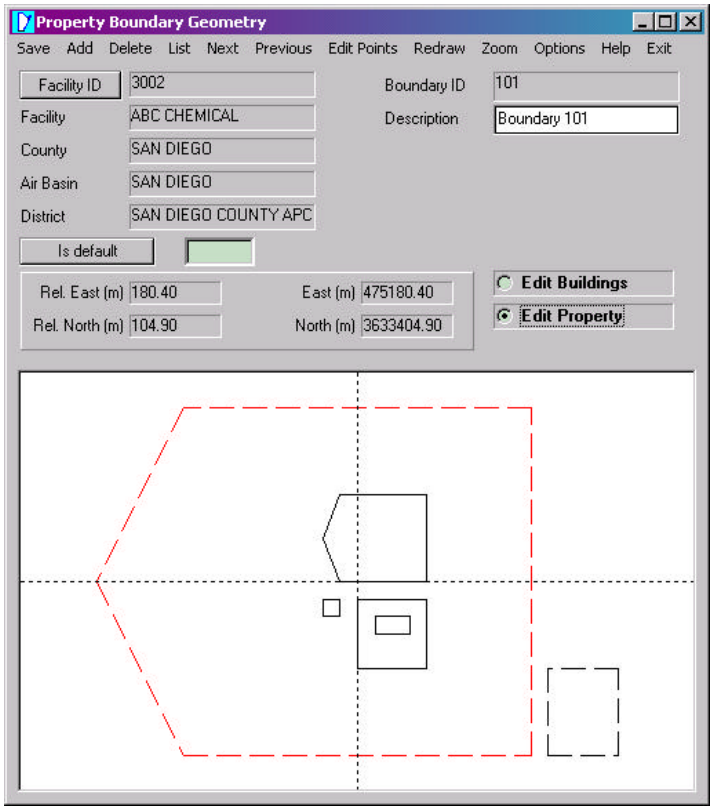


Illustration of Property Boundary Points



- ➢ On the ***Property Boundary Geometry*** window select ***Save*** to save the changes you have made.
- o The ***Property Boundary Points Geometry*** window should appear as shown below.
- o Note that both the property boundaries and building boundaries are shown. The currently selected property boundary is colored red.
- o You may toggle between editing buildings and editing property boundaries by clicking on the corresponding radio button just above the graphic pane of the window. This is a short cut that avoids having to exit and return from the facility window.
- ➢ Add another property boundary with the coordinates shown below.
- o The graphical window should now appear as shown in the next figure.





4.4.8 Sensitive Receptor Data

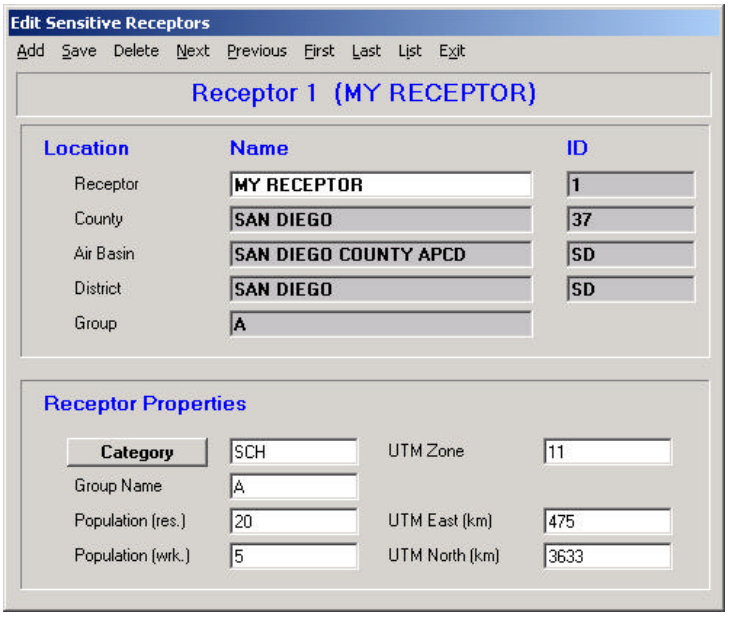
Sensitive receptors are specific points of interest defined by you where you want to calculate the health effects. A sensitive receptor might be a school, a nursing home or simply a residence. Once you have defined a sensitive receptor it is fairly easy to include that receptor in the dispersion and risk analysis. It is not essential that sensitive receptors be defined in the database, since new receptors can be added arbitrarily when you set up the dispersion analysis.

Sensitive receptor data is stored in the HARP database. The data is independent of the reporting year, so you may enter the data once and use it for multiple reporting years.

- From the HARP main menu select ***Edit Data/Sensitive Receptors***
  - If you have not yet entered any receptor data you will be reminded that there is no sensitive receptor data yet defined. The demonstration data may already contain sensitive receptor data, which will be displayed.
- To add a new receptor to the database select ***Add***.
  - The ***New Receptor*** window will appear.
- Enter a receptor ID of 1.
- Click the button labeled ***Select CO/AB/DIS***. Select San Diego County.
- Enter a description next to ***Group***.

- The group description is arbitrary. Assigning the same group name to several sensitive receptors will make it convenient to select that group of receptors when setting up the dispersion analysis.
- ➢ Enter a description next to ***Group***.
- The group name is limited to 8 characters.
- The ***New Receptor*** window should now appear as shown below.
- ➢ Click ***OK*** to return to the ***Edit Sensitive Receptors*** window.

- ➢ Enter a descriptive name next to ***Receptor***.
- ➢ Click *Category* to select a receptor category. This is for your information only and is optional.
- ➢ Enter the population and UTM data as shown below.
- ➢ Select ***Save***.
- The demonstration database contains two other receptors for this area. Each belongs to the group TUTORIAL.
- Use the button on the menu of the ***Edit Sensitive Receptors*** window to navigate through the receptors in the database. The ***List*** option allows you to see a list of all the receptors and jump to any receptor for editing.
- Receptor data can be exported and imported using transaction files (see chapter 7).



4.5 Track 4 - Reports

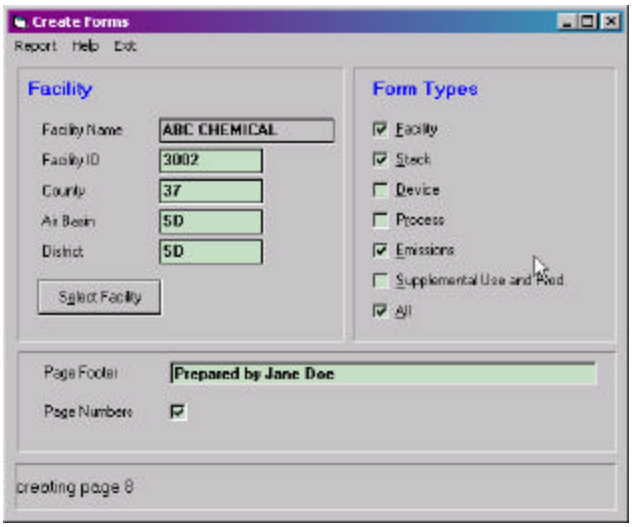
4.5.1 Inventory Reporting Forms

The inventory reporting forms are used to submit hard copy records of the emissions inventory for a facility to a local air district office or ARB. The forms are populated with data that is in the database and provides space to manually write in corrections with a pen.

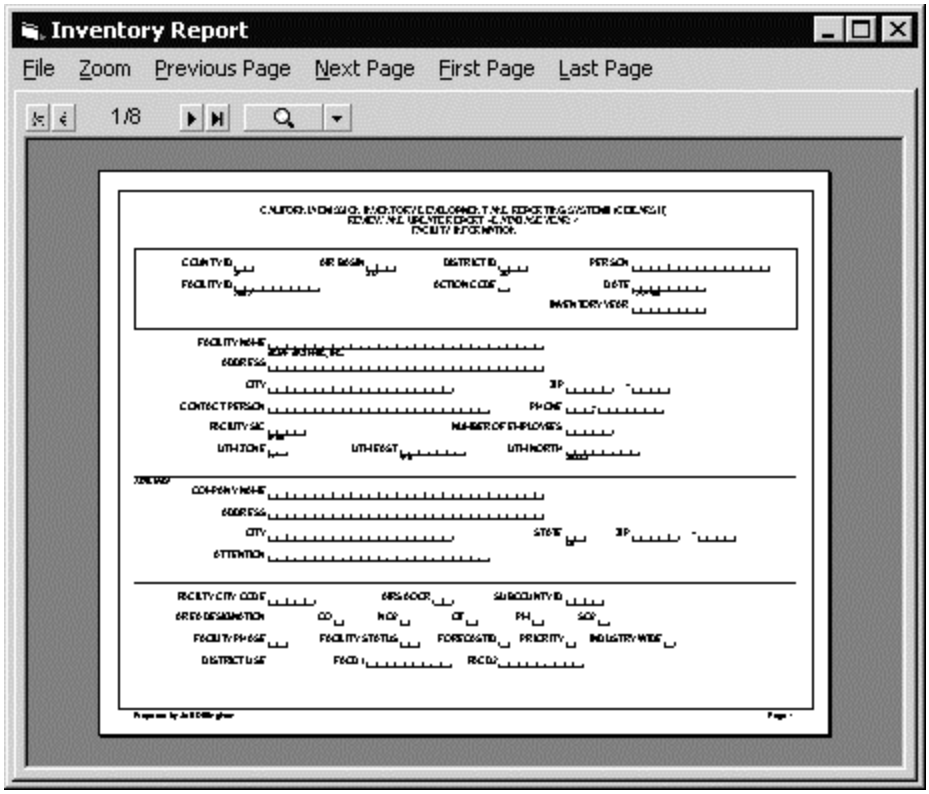
These reports are rendered somewhat redundant by electronic transmission of data. Electronic transmission of emission inventory data is accomplished by using HARP to create a transaction file. The original intent of these reports is to allow districts or ARB to create reporting forms from existing data for facilities that do not have the computer or human resources to run HARP. The forms can then be filled in by the facilities using a pen and mailed back to the district or ARB.

- From the HARP main window, select ***Reports/Inventory Reporting Forms***.
- Click the button labeled ***Select Facility***.
- Select ABC Chemical from the list. You can do this by clicking on the name once, then pressing ***OK***, or by double-clicking on the name.
- Check the box labeled ***All*** to generate emission inventory report forms for facilities, stacks, devices, processes, emissions and supplemental use.
- Enter a descriptive phrase for the page footer.
- Check the box labeled ***Page Numbers*** to cause the pages of the report to be numbered sequentially.

o The ***Create Forms*** window should appear as shown below.



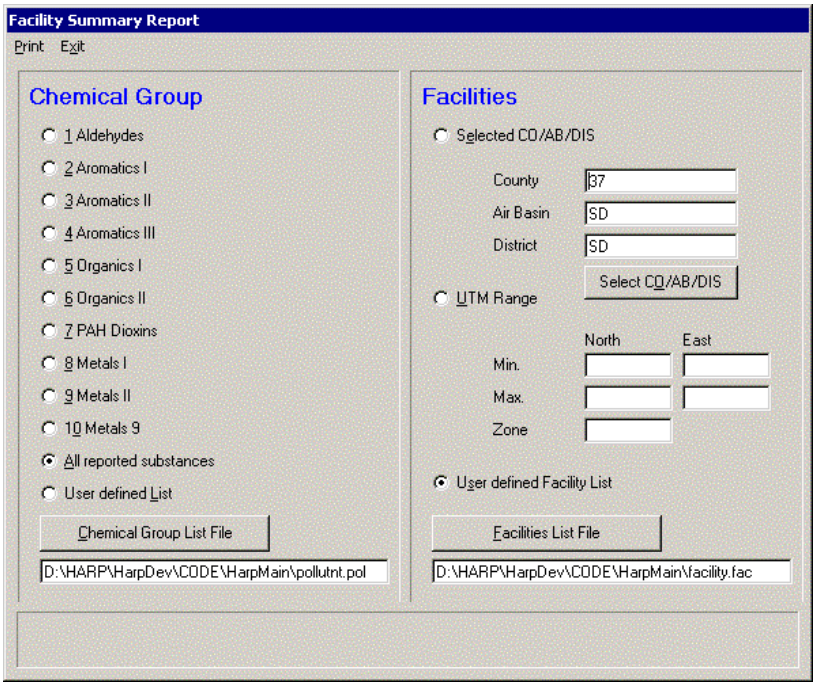
- From the menu, select ***Report/Build Report and Preview it***
- You may receive a warning that 'No supplemental use records are found' if you have not yet entered supplemental use data. (Supplemental use data is entered by selecting ***Supplemental from the Facility Data*** window.)
- The *Inventory Report* preview window will appear as shown below. There are 8 pages in the report. The numbers near the top of the window show that you are currently viewing page 1 out of 8.
- Preview the page of the report by using the menu to navigate forward and backward one page at a time.
- Zoom in and out by using the options under the **Zoom** menu.
- Zoom in by double-clicking with the left mouse button on the document.
- With the document zoomed in to a large scale, click and hold the left mouse button while dragging the mouse around the document window. This allows you to view different parts of the document when it is too big to fit in the window.
- Zoom out by double-clicking with the right mouse button on the document.
- Save this report to a file by selecting ***File/Save*** from the menu. You may later retrieve this report by selecting ***File/Open***.
- If you have a printer, print the current page by selecting ***File/Print Current Page***, or print the entire document by selecting ***File/Print Entire Document***.



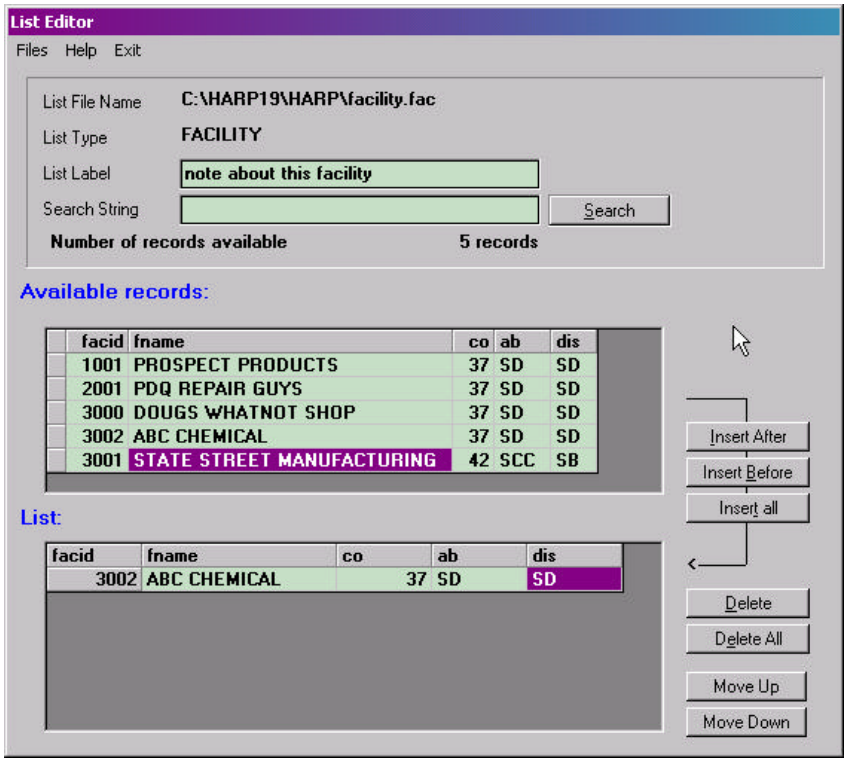
4.5.2 Emissions Summaries

4.5.2.1 By Facility

- From the menu, select ***Report/Emission Summaries/By Facility***
- The ***Facility Summary Report*** window appears as shown below.
- Click ***All Reported Substances***.
- Click ***User defined Facility List***. This indicates that you intend to generate a report for one or more specific facilities that you will define.



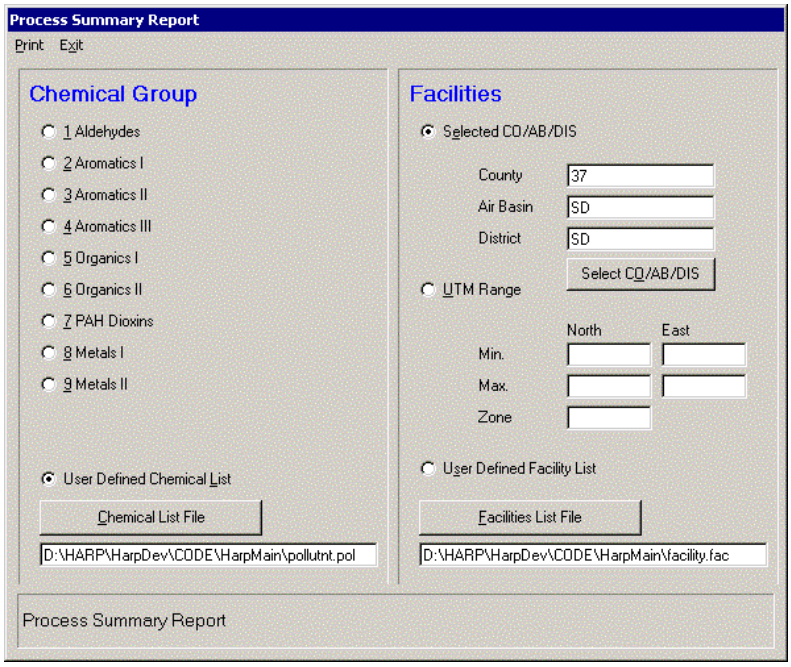
- ➢ To define the list of facilities that you wish to report, click the button labeled ***Facilities List File***.
- o The ***List Editor*** window will appear similar to what is shown below. (This list of facilities in the lower pane of the window will probably be different on your screen.)
- o The list of facilities that you want to report is shown in the lower pane of the window.
- ➢ Clear the lower list by clicking ***Delete All***.
- ➢ Click on ABC Chemical in the upper list.
- ➢ Click the button labeled ***Insert After***.
- o The lower list should now contain only one facility, ABC Chemical.
- o For this simple example, there is only one facility in the database. If you have added several facilities to the database, they will all appear in the upper list. Click the ***Insert After*** or ***Insert Before*** buttons repeatedly to add other facilities to the reporting list.
- o To make it easier to locate a particular facility when there are many in the database, enter a character string next to ***Search String***, and then press the *Search* button. The upper list will then show only those facilities whose name partially matches the search string.
- ➢ Select ***Files/Save***. The list will be saved to the file whose name is shown next to ***List File Name***. This list may later be recalled.
- ➢ Click ***Exit*** to close the ***List Editor*** window and return to the ***Facility Summary Report*** window.



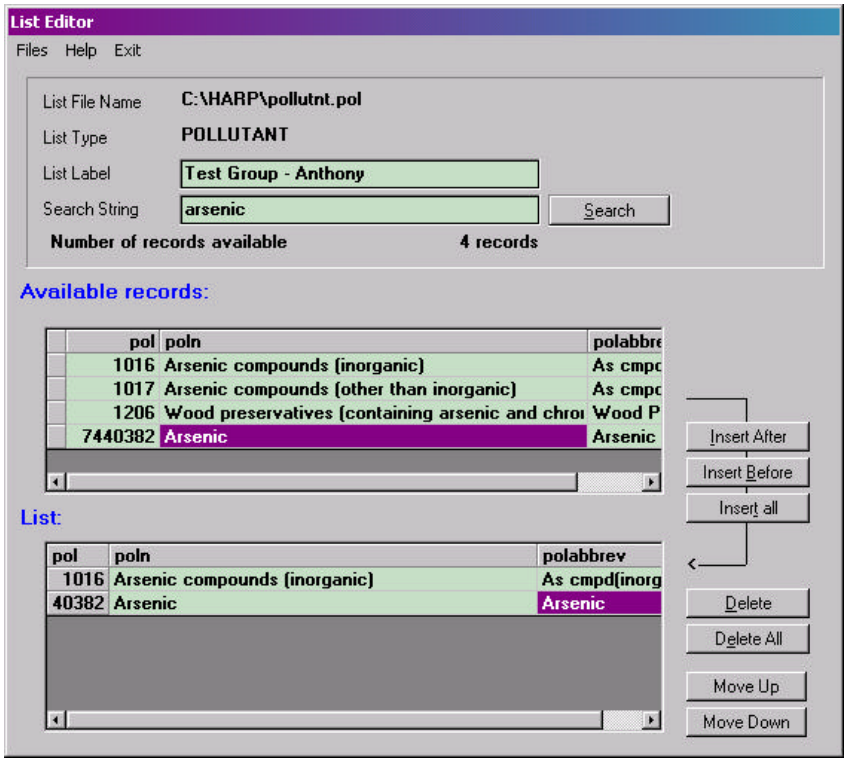
- From the ***Facility Summary*** Report window, select ***Print/Preview***
- The facility emissions summary report will be displayed in the report preview window. Use the menu as described in the previous section to navigate through the report or to print it.
- Each of the reports described in section 4.5.2 is written to a temporary file before it is previewed or printed. The temporary file is named OUTPUT.TXT, and is located in the HARP program directory. You may import this file to a word processor, however remember that the file is overwritten during each report, so if you want to preserve it you should rename it or copy it to a different directory.

4.5.2.2 By Process

- From the menu, select ***Report/Emission Summaries/By Facility***
- The *Process Summary Report* window appears as shown below.
- Click ***Select COABDIS***. This indicates that you want to create a report for all facilities in a particular County/Air Basin/District.
- Click the button labeled ***Select CO/AB/DIS*** to display a list of valid CO/AB/DIS. Select San Diego.
- The window should now appear as shown below.



- Click ***User Defined Chemical List***. This indicates that you intend to generate a report for one or more specific chemicals that you will define.
- Click the button labeled ***Chemical List File***. This will allow you to edit the list of chemicals that you want to report.
- On the ***List Editor*** window, click *Delete All* to clear the lower list.
- Next to *Search String* enter 'arsenic' (without the quotes).
- Click the ***Search*** button.
- The upper list now shows only those chemicals that have 'arsenic' somewhere in the name.
- Click on the first entry in the upper list (pol 1016). The column labeled pol contains the chemical CAS numbers.
- Click ***Insert After*** to add CAS 1016 to the lower list.
- Repeat this procedure to add CAS 7440382 to the list.
- Select ***File/Save***.
- Select ***Exit*** to return to the ***Process Summary Report*** window.



- From the ***Process Summary Report*** window, select ***Print/Preview***.

o The process emissions summary report will be displayed in the report preview window. Use the menu as described in the previous section to navigate through the report or to print it.

4.5.3 Prioritization

The priority report is a calculation of facility prioritization scores as defined in the CAPCOA Prioritization Guidelines.

Generating the prioritization report is a three-step process: 1) the receptor proximity must be entered or calculated for each facility for which you intend to calculate priority; 2) the calculation of priority score is performed for one facility or for all facilities in a district, and the scores are stored in the data base in the Device table; 3) the prioritization report is created by referring to the previously calculated values. For more information on prioritization, see chapter 8.

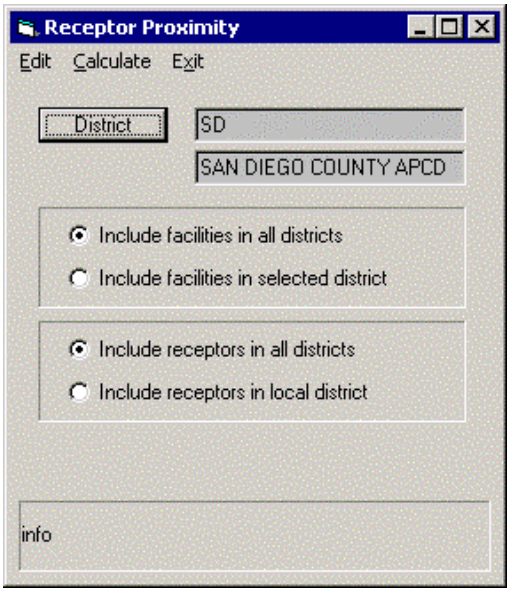
First set the receptor proximity for ABC Chemical:

- Open the ***Facility Data*** window. If you have entered data for more than one facility, select *List* to bring up the data for ABC Chemical.

- Next to the button labeled ***Receptor Proximity***, enter a value if you know what it is. If you do not know the receptor proximity, press the button and it will be calculated and inserted for you.
- The receptor proximity is calculated based on the distance from the nearest sensitive receptor to the facility property boundary. If you have not yet entered any receptor data, then the receptor proximity will be set to a large number.
- Select ***Save***.

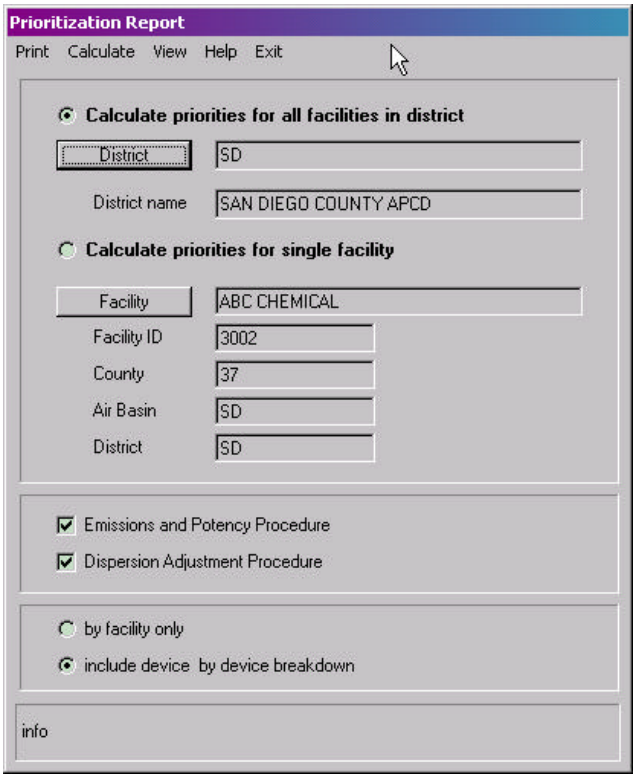
An alternative procedure for calculating receptor proximities, which is more convenient than doing it one facility at a time, is as follows:

- From the HARP main menu, select ***Utilities/Receptor Proximities***
- The ***Receptor Proximity*** window will appear as shown below.
- Click the button labeled ***District***. Select the San Diego district from the list.
- Click ***Include Receptors in all districts.***
- The demonstration database that is delivered with HARP already contains some receptor data. The receptor data is not specific to a reporting year. In other words, if you enter the data once, it will be used for all reporting years.
- Select ***Calculate.*** The receptor proximity data will be calculated and stored in the database.
- Click ***Exit*** to return to the HARP main window.



The following steps are used to calculate the priority scores for all facilities:

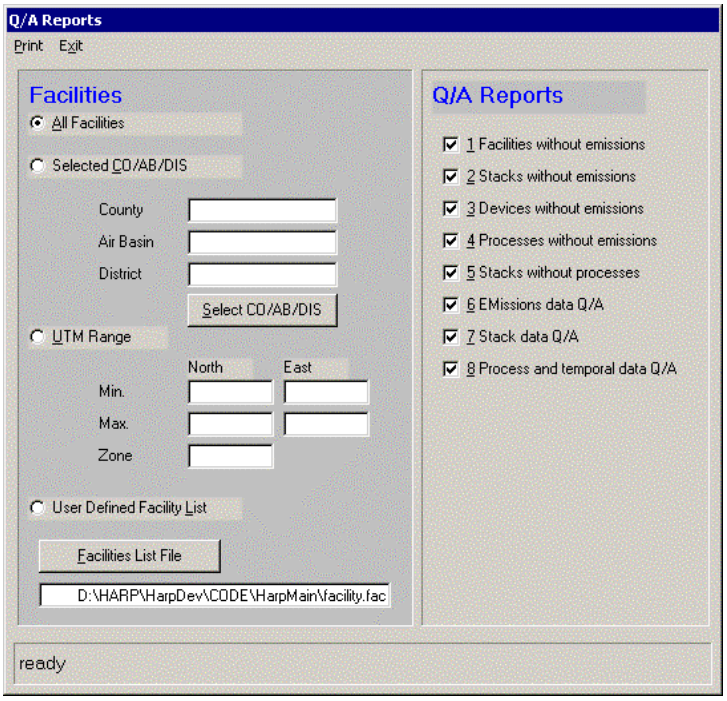
- From the HARP main menu, select ***Reports/Prioritization***
  - The ***Prioritization Report*** window will appear as shown below.
- Click ***Calculate priorities for all facilities in district***.
- Click the button labeled *District*.
- From the list of districts that appears select San Diego.
- Select ***Calculate/Update Priority Database***.
  - The priority scores have now been updated in the Device table.
- From the ***Prioritization Report*** window, select one or both of the reporting methods, Emissions and Potency Procedure and/or Dispersion Adjustment Procedure. These analysis procedures are described in the CAPCOA Prioritization Guidelines.
- Click ***Include Device by Device Breakdown*** if you want to see the relative contribution of individual devices to the priority score.
- Select ***Print/PreviewReport***.
  - The report is written to the text file named PRIORITY.TXT, which is located in your project directory. After the report is generated, it will be displayed in the report preview window. From there it can be printed directly to the printer.
- Click ***Exit*** to return to the HARP main window.



4.5.4 Q/A Report

The Q/A reports are designed to seek out and identify some of the most common data entry errors. Many of these potential errors do not affect the risk analysis results, but nevertheless represent missing data that ARB expects to have submitted.

- From the HARP main menu, select ***Reports/QA Report***.
- The ***Q/A Report*** window will appear as shown below.
- The Q/A report has now been written to the file named QAREPORT.TXT, located in your project directory. The report will be displayed in the report preview window.
- Click ***Exit*** to return to the HARP main window.



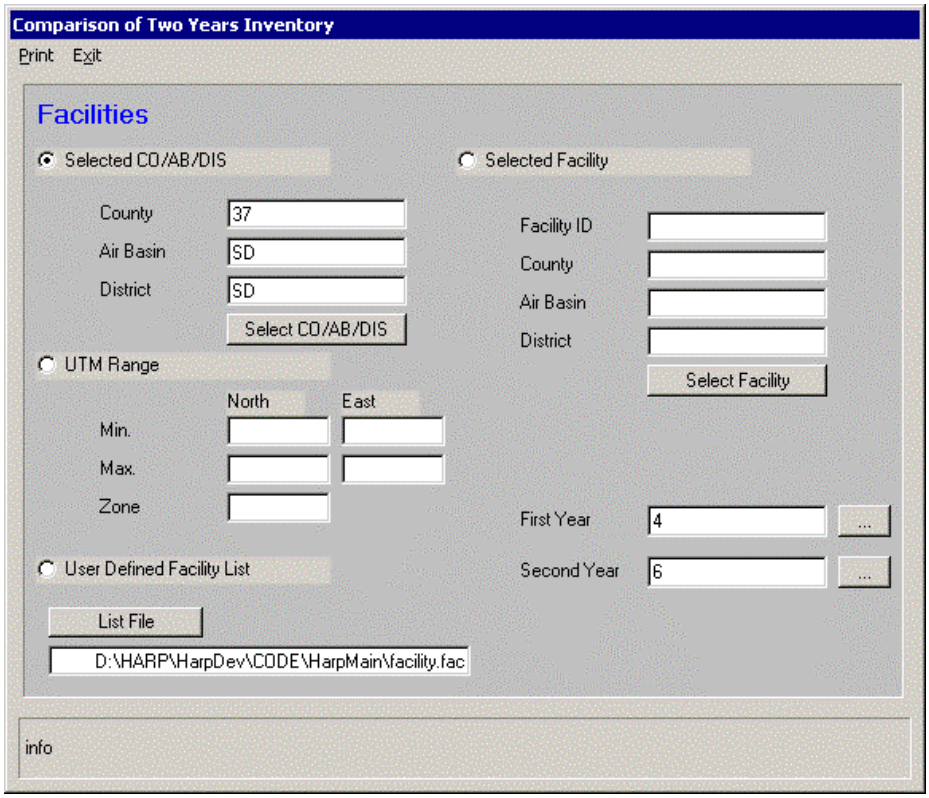
4.5.5 Compare Two Years

This report allows you to compare emissions data for one or more facilities for two different years. This is intended to aid reviewers in determining what has changed from one year to the next and to highlight large changes in emissions.

In order to exercise this function you first must have two years of data. The following steps will demonstrate how to easily create some sample data for two years, and then generate the report.

- From the HARP main menu, select ***Utilities/Multiyear***.
- Next to ***Source year for copy*** enter -4.
- Next to ***Target year for copy*** enter -5.
- Click the button labeled ***Copy all data from source year to target year***.
  - You have now created a copy of all of the data that you entered for year -4. The copy is stored under year -5.
- Next to ***Change Reporting Year To:*** enter -5 and click the button.
- Click ***Exit*** to return to the HARP main window.
- Select ***Edit Data/Facilities and Emissions***.
- When the *Facility Data* window appears select *Device.* In the subsequent windows select *Process* then *Emissions* to get to the emissions window.
- Enter new values for ***Annual EMS*** **and** ***Hr. Max.EMS***.

- Select ***Save***.
- Select ***Exit*** four times to return all the way to the HARP main window.
- You have now altered the emissions data for ABC Chemical for year -5. You will proceed to generate a report comparing years -4 and -5.
- Select ***Reports/Compare Two Years***.
- The ***Comparison of Two Years Inventory*** window will appear as shown below.
- Click ***Selected CO/AB/DIS***.
- Click the button labeled ***Select CO/AB/DIS***. Select San Diego from the list
- Next to ***First Year*** enter -4.
- Next to ***Second Year*** enter -5.
- Select ***Print/Preview***.
- The ***Report Preview*** window appears. Use the menu to navigate through the report or print it.
- The report will be written to the file named COMPARTWOYEARS.TXT, which is located in your project directory.
- For each facility and chemical the report shows the annual average and hourly maximum emissions rates for the two years that you specified, and the percentage change from one year to the other.
- Click ***Exit*** to return to the HARP main window.


Comparison of Two Years Inventory
Print
Exit
Facilities
Selected CO/AB/DIS
County
37
Air Basin
SD
District
SD
Select CO/AB/DIS
UTM Range
North
East
Min.
Max.
Zone
User Defined Facility List
List File
D:\HARP\HarpDev\CODE\HarpMain\facility.fac
Selected Facility
Facility ID
County
Air Basin
District
Select Facility
First Year
4
Second Year
6
info

4.6 Track 5 - Dispersion Analysis

4.6.1 Getting Started with Dispersion Analysis

In this tutorial track you will set up and run a dispersion analysis for ABC Chemical. By now you should have entered data into the CEIDARS-Lite emission inventory database. If you have not entered any facility data, please exit the dispersion module and from the main menu choose ***Edit Data/Facility and Emissions***. For instructions on how to use the CEIDARS-Lite emission inventory database please see Chapter 5.

HARP has a feature that will convert all of the UTM coordinates in the HARP (CEIDARS-Lite) database to one default projection system. So it is important to set the default projection before setting-up your dispersion analysis.

- From the HARP main menu, select ***Utilities/Switch Default Coordinates***
- Click on the coordinate system that you would like to apply to your data. In this example we will choose ***UTM NAD83***.

To begin setting up the dispersion anlaysis, you must open an existing dispersion analysis workbook. Dispersion analysis workbooks end with a .ISC extension. If you are starting a new project, and you open the Dispersion window, HARP will copy an example workbook called STARTUP.ISC into your project directory and open it. You should then save it to another file with a name that is meaningful to you. Remember: NO spaces in file names. A copy of this file, called DEMO.ISC, is in the HARP\PROJECTS\DEMO directory and will be used for the tutorial.

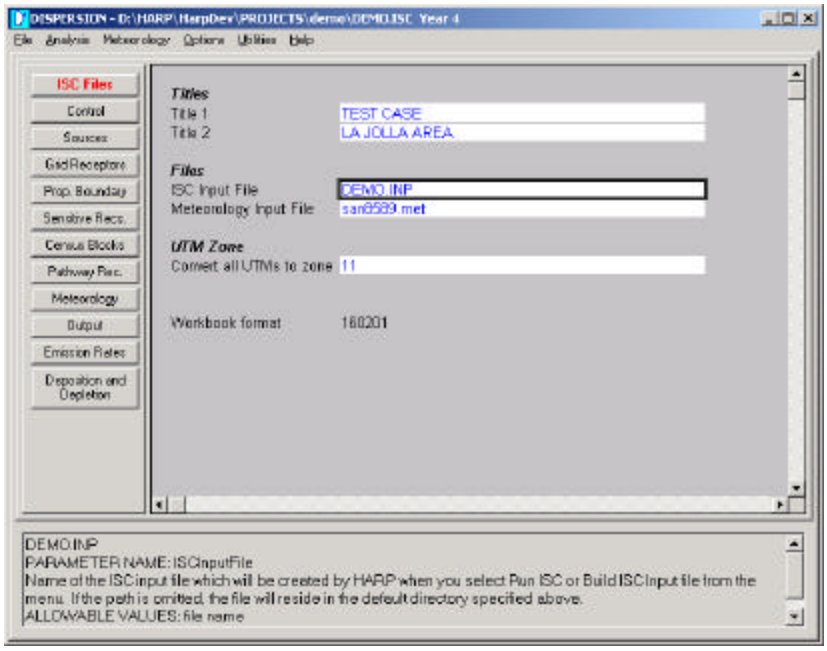
- From the HARP main menu, select ***Analysis/Dispersion Analysis/Representative Met Data***

- The ***Dispersion*** window will appear. HARP will attempt to open the most recent workbook that you have used for this project. If this is a new project, HARP will create a new workbook in your project directory. It will be named STARTUP.ISC. You should then select ***File/Save As*** to save the new workbook to a file whose name is meaningful to you. Save the workbook to a file named ABCChemical.ISC.
- The next time you open the *Dispersion* window, HARP will automatically open this ISCST3 workbook file.
- You are now ready to begin entering the parameters that control the dispersion analysis.
- The dispersion analysis is done by the program ISC.EXE, which is available from the U.S. EPA. After you have entered all of the run control parameters onto the ISC workbook, HARP will build an input file for ISCST3 and run it.

- The ISC workbook is in the form of a spreadsheet with multiple pages. The buttons on the left side of the window are used to select which page is being displayed and edited. The following sections of the tutorial will guide you through each of the ISC workbook pages in sequence.
- As you move the cursor around on the workbook, the pane at the bottom of the window shows information about the parameter that you are editing. This information includes the current value, the name of the parameter, a brief description and the allowable values.
- For parameters that correspond directly to ISCST3 input parameters, the help pane at the bottom of the window shows the name of the ISCST3 keyword. Each of these keywords is described in detail in the ISCST3 manual and in Appendix F of this user guide . For more information see chapter 9 of the HARP user guide.
- **Note**: To edit a cell without completely retyping the entry, hit ***F2*** on your keyboard. The cell can now be edited.

4.6.2 Files

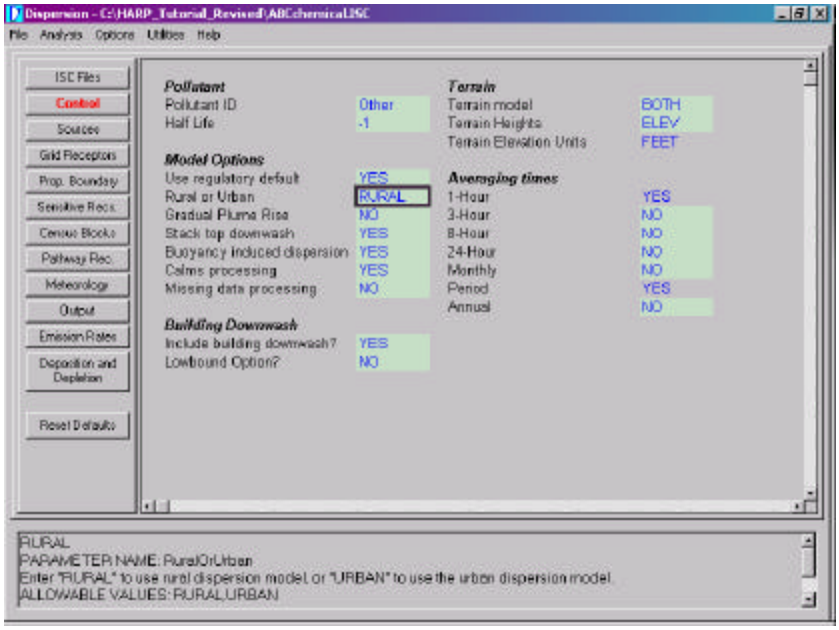
- Click the ***ISC Files*** button.
- In the white cells on the workbook enter the information as shown below.
- As you move the cursor around on the workbook, the pane at the bottom of the window shows information about the parameter that you are editing. This information includes the current value, the name of the parameter, a brief description and the allowable values.
- The titles are echoed in the ISCST3 input and output files.
- The ***ISC Input File*** is the name of the ISCST3 input and output files that HARP will create for you when you execute ISCST3. Note: NO SPACES are allowed in file names.
- ***Meteorology Input File*** is the name of the meteorology data file that ISCST3 will use when it runs. This file must exist in the project directory (or in a directory with a short path). Three sample files are located in the HARP program directory. Each file ends with a .MET extension.
- The installation CD includes a screening meteorology file called SCRNMET.MET and a set of meteorology files for various stations across California.
- When HARP opens a meteorology file it will automatically fill-in the start and end time on the meteorology worksheet. The name of the meteorology file will appear on the ***ISC Files*** worksheet. HARP will read meteorology files with the extensions *.met, *.txt, *.dat, *.sam, and *.asc.
- Select ***Meteorology/Open Meteorology File*** from the menu.
- Select SD8589.MET, a sample met file for the San Diego area that is installed in your DEMO directory.
- Before continuing, select ***File/Save*** to save the changes you have made thus far.



4.6.3 Control Parameters

- Click the ***Control*** button.
- In the white cells on the workbook enter the information as shown below.

- For parameters that correspond directly to ISCST3 input parameters, the help pane at the bottom of the window shows the name of the ISCST3 keyword. Each of these keywords is described in detail in the ISCST3 manual.
- The titles are echoed in the ISCST3 input and output files.
- When you set the model option ***Use Regulatory Default*** to Yes, the following parameters are set to the default values: 1) gradual plume rise is NO (i.e. use final plume rise); 2) stack tip downwash is YES; 3) buoyancy induced dispersion is YES; 4) calms processing is YES; 5) missing data processing is NO; 6) no exponential decay for rural mode; 7) Lowbound option for building downwash is NO.
- In the example below, the cursor is placed on ***Rural or Urban***. Note that the help pane on the bottom of the window displays ISCST3 KEYWORD: MODELOPT/RURAL/URBAN. This is the ISCST3 keyword and keyword value that is described in the ISCST3 manual and in Appendix F of the HARP user guide.
- Because we have entered building geometry data into the database we intend to use the building downwash option. So, ***Include building downwash?*** should be YES.



4.6.3.1 Calculating Building Downwash

Building downwash is calculated automatically if you have set the parameter ***Include Building Downwash*** to YES on the *Control* sheet. Building downwash will then be included for all facilities for which building geometry data has been provided in the database.

NOTE: Building downwash is only calculated for point sources (not volume or area sources).

Building downwash is calculated using the BPIP program ("Building Profile Input Program") that is available from the U.S. EPA. BPIP is a preprocessor that converts the building geometry into a format that can be input directly into ISCST3. If you want to include building downwash in the ISCST3 calculations, running BPIP is a necessary step. This is made quite easy in HARP. If the *Include Building Downwash* parameter is set to YES, then when you set up and run ISCST3 HARP does the following steps:

1. For each source that is listed on the Sources sheet of the ISC workbook, HARP looks up the building(s) geometry for the facility (i.e. the facility that that particular source belongs to).
2. Using the building geometry, HARP builds an input file for the BPIP program.
3. HARP runs BPIP. BPIP produces an output that is in a format that can be inserted into an ISCST3 input file.
4. HARP reads the BPIP output and inserts it into the correct location in the ISCST3 input file.
5. The steps above are repeated for each source (release point)

The building geometry is not displayed on the ISC workbook. If you want to edit it, you must go back to the emissions inventory database, select the facility, and then select the Geometry menu item from the facility window. HARP cannot run BPIP for facilities that do not have building data in the HARP database.

For further details on the BPIP program, you should consult the BPIP manual, which is included in the references directory of the HARP installation disk.

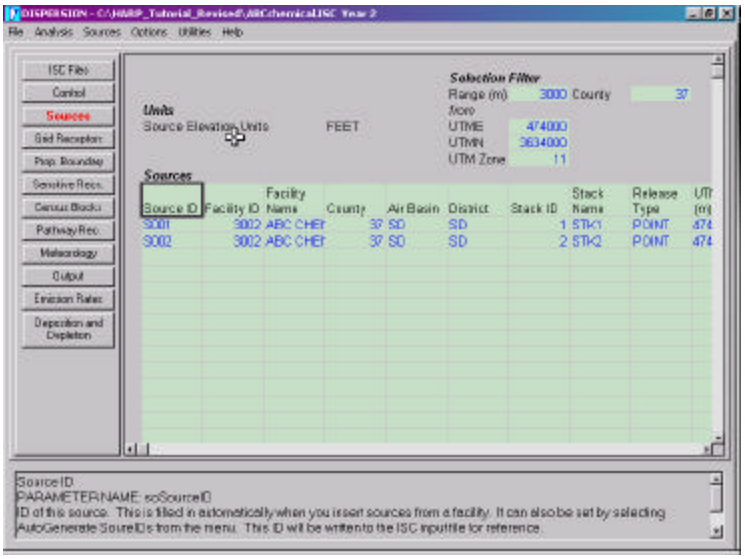
To greatly speed up the calculations, BPIP has been converted into a dynamic link library (DLL) that is automatically installed with HARP. The results of BPIP are written to temporary files that are read by HARP to build the corresponding ISCST3 input.

Because BPIP runs so quickly, it is not necessary to store and save the BPIP results between setting-up ISCST3 runs. BPIP is simply rerun each time you set up and run ISCST3. This greatly simplifies file management and ensures that any changes that you make to the building geometry are always taken into account when setting up ISCST3.

4.6.4 Defining Emission Sources

- ➢ Click the ***Sources*** button.
- o Since you always start with an existing workbook the old data must be deleted before you add the new data for the current project.
- ➢ Select ***Source/Delete All Sources.*** The data in the table is cleared. This table will be used to enter a description of all the sources for which you want to run dispersion analysis.
- o Each line of the source table corresponds to one stack. A single facility may have many stacks.
- o Data may be entered manually in the source table or edited at a later time. Fill in each row and column for all stacks that you want to include. The first row in the table where the *Source ID* is blank will indicate to HARP the end of the source data. All subsequent rows will be ignored.
- o Rather than fill out the source table manually, data may be filled into the source table in a couple of simple steps as follows using information retrieved from the HARP database as follows.
- ➢ Place the cursor on the first empty line in the source table, just below *Source ID.*
- ➢ Select ***Source/Insert Entire Facility.***
- ➢ When the list of facilities appears, select ABC Chemical.
- o The source table should now be populated with two rows of data, one for each of the stacks of ABC Chemical. The ***Source ID*** column is still blank
- o The *Source ID*s are arbitrary labels that are used to identify each source in the ISCST3 input and output files. Source IDs can be filled in manually if you wish. The following steps fill them in automatically, which is useful if you have a large number of sources.

- ➢ Place the cursor on the first line in the source table (stack 1)
- ➢ Drag the mouse downward to highlight all populated rows in the table (only 2 rows in this example).
- ➢ Select ***Sources/Auto-generate source IDs***
- o The window should now look as shown below.
- o If you want to delete one or more rows from the source table, highlight the rows by dragging the mouse across the rows you want to delete (you only need to highlight one column). Then select ***Sources/Delete Rows***.
- ➢ Scroll the window to the right to review all of the parameters.
- o Any text on the workbook that is colored blue can be edited at this point. This allows you to edit the ISCST3 input, thereby overriding the values that you retrieved from the database. This can be used to investigate different hypothetical scenarios without altering the permanent data in the database.

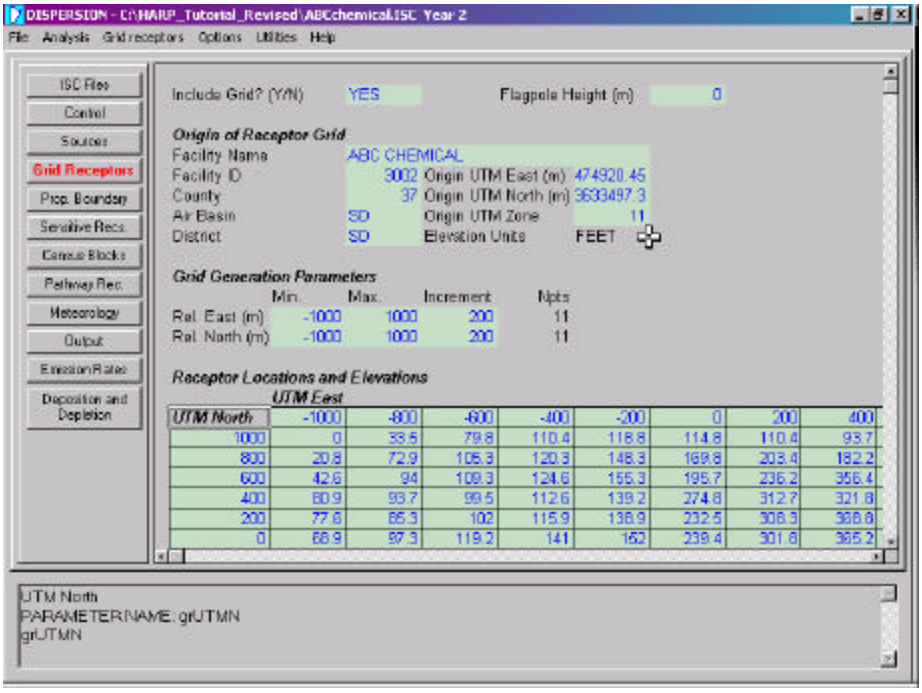


- o Using the *Selection Filter* is an alternative method for populating the source table. The selection filter specifies a range of sources that you want to insert from the database into the table.
- ➢ Enter the parameters under ***Selection Filter*** as shown above.
- o The UTM coordinates are near ABC Chemical. The UTM zone and county correspond to San Diego. The range indicates that you want to insert all sources within 3000 meters of the specified UTM coordinates.
- ➢ You can also set the *Selection Filter* origin to a facility location. Select ***Sources/Selection filter/Set Selection Filter Origin to Facility Location***. Select ABC Chemical from the list of facilities.
- ➢ Place the cursor on the first blank row of the source table.

- ➢ Select ***Sources/Insert Sources Using Selection Filter***.
- o The source table should now be populated with two new rows, which contain the same data as before. Note that only two stacks were inserted because the database contains only one facility.
- ➢ Fill in the source IDs as before.
- ➢ Select ***File/Save***.

4.6.5 Setting Up a Receptor Grid

- o Receptor grids are used primarily to calculate dispersion, and subsequently risk, over an area of interest so that isopleths (contours) can later be calculated.
- o You will create a grid of receptors centered at the location of ABC Chemical and spanning a distance of 1000 m from the center in each of the four compass directions. Grid spacing will be 200 meters. (This is a fairly coarse grid spacing, but is useful for demonstration because of the relative short analysis time).
- ➢ Set ***Include Grid?*** to YES. If this is NO, then all of the information on this sheet will be ignored and no grid receptors will be included in the analysis.
- ➢ Select ***Grid Receptors/Set Origin to Facility***. When the list of facilities appears, select ABC Chemical.
- o The parameters under ***Origin of Receptor Grid*** should now be set to the values shown below. You may move the origin if you wish by manually editing the UTM coordinates. The other facility parameters are for your information only to remind you where the UTM coordinates came from.
- ➢ Enter the ***Grid Generation Parameters*** as shown below to specify the width, height, and receptor spacing of the grid. Remember, to edit a cell without completely retyping the entry, hit ***F2*** on your keyboard. The cell can now be edited.
- ➢ Select ***Grid Receptors/Generate Grid***.
- o The window should now appear as shown below. The east and north UTM coordinates of each of the receptors are shown along the top row and left column of the table. The other values in the table show the elevations at each of the grid points.
- o Elevations can be entered manually. They can also be retrieved from a digital elevation model (DEM) file. Chapter 11 explains how to obtain a DEM file for your area. The following steps show how to look up elevation data to populate this sheet automatically.
- ➢ Select ***File/DEM/Open DEM File***. The demo directory contains two DEM files for the La Jolla area of San Diego. Open the file named la_jolla__oe_w.dem
- ➢ Select ***Grid Receptors/Fill in elevations***.
- o The elevations for all grid receptors will be filled in on the worksheet.
- ➢ Select ***File/Save***.



4.6.6 Defining Property Boundary Receptors

- Property boundary receptors are placed along the boundaries of one or more facilities that are being included in the dispersion analysis. These are used to help identify the maximum exposed individual (MEI), which typically lies on or near the facility property boundary, since the boundary contains the closest points to the stacks. The MEI does not necessarily lie on the property boundary, but often will.

➢ Click the ***Prop. Boundary*** button.

➢ Set ***Include boundary receptors?*** to YES. If this is NO, then all of the information on this sheet will be ignored and no property boundary receptors will be included in the analysis.

➢ Select ***Boundary Receptors/Delete All Boundary Receptors***. The boundary receptor sheet will be cleared.

➢ Click on the first empty row of the table to indicate where you want the receptors inserted.

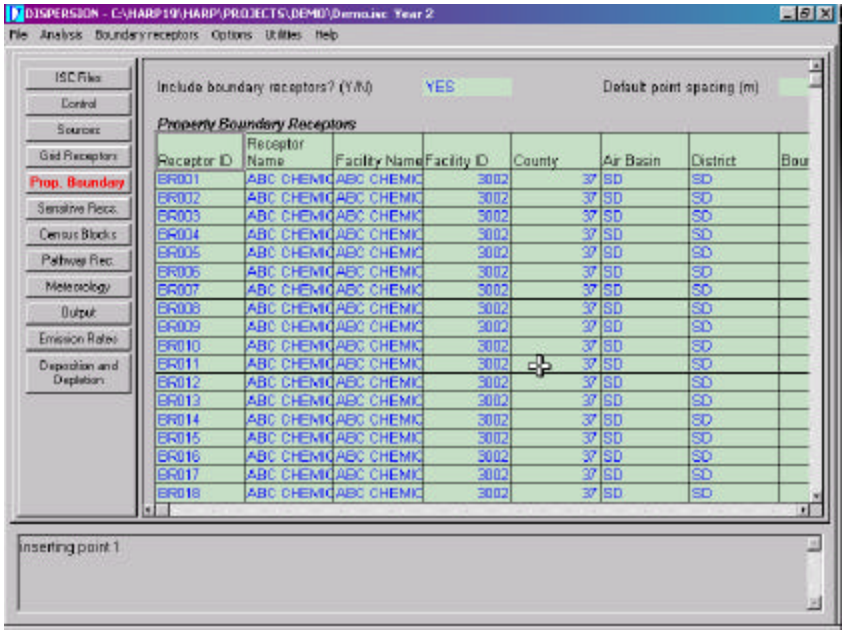
➢ Select ***Boundary Receptors/Insert Facility Boundary Receptors***.

➢ From the facility list that appears, select ABC Chemical.

➢ Select ***Boundary Receptors/Fill in Elevations***. This presumes that you have already opened the DEM files as described in the previous section.

- The boundary receptor table is now populated, as shown below. The elevations have been added to the column on the right. These may be manually edited if you wish.

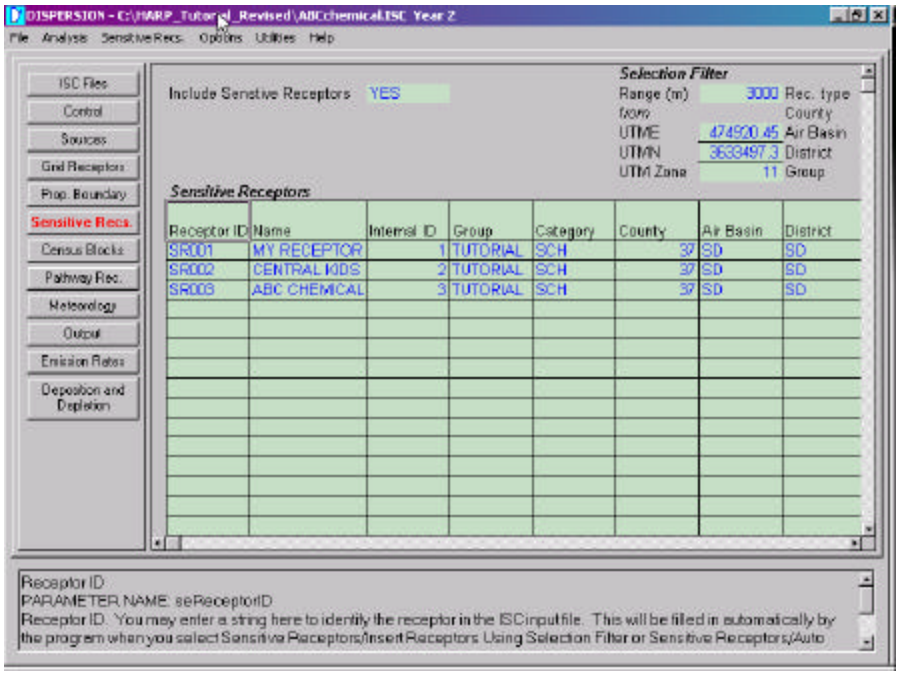
➢ Select ***File/Save***.



4.6.7 Defining Sensitive Receptors

- Sensitive receptors are specific points of interest defined by you where you want to calculate the health effects. A sensitive receptor might be a school, a nursing home or simply a residence. Once you have defined a sensitive receptor it is fairly easy to include that receptor in the dispersion and risk analysis
- ➢ Click the ***Sensitive Receptors*** button.
- ➢ Set ***Include Sensitive Receptors*** to YES. If this is NO, then all of the information on this sheet will be ignored and no sensitive receptors will be included in the analysis.
- ➢ Select ***Sensitive Receptors/Delete All Sensitive Receptors from Table.*** The sensitive receptor sheet will be cleared.
- ➢ Clear all of the cells on the sheet under ***Selection Filter***. To clear a cell, place the cursor on the cell and press the Delete key.
- ➢ Select ***Sensitive Receptors/Selection Filter/Set selection filter origin to facility location.***
- ➢ From the list of facilities that is displayed, select ABC Chemical.
- The UTM coordinates under *Selection Filter* are now set to the coordinates of ABC Chemical.
- ➢ Enter 3000 next to *Range.*
- The selection filter is now set to select all receptors within 3000 meters of the specified UTM coordinates.
- ➢ Click on the first empty row of the table to indicate where you want the receptors inserted.
- ➢ Select ***Sources/Insert receptors using selection filter***.

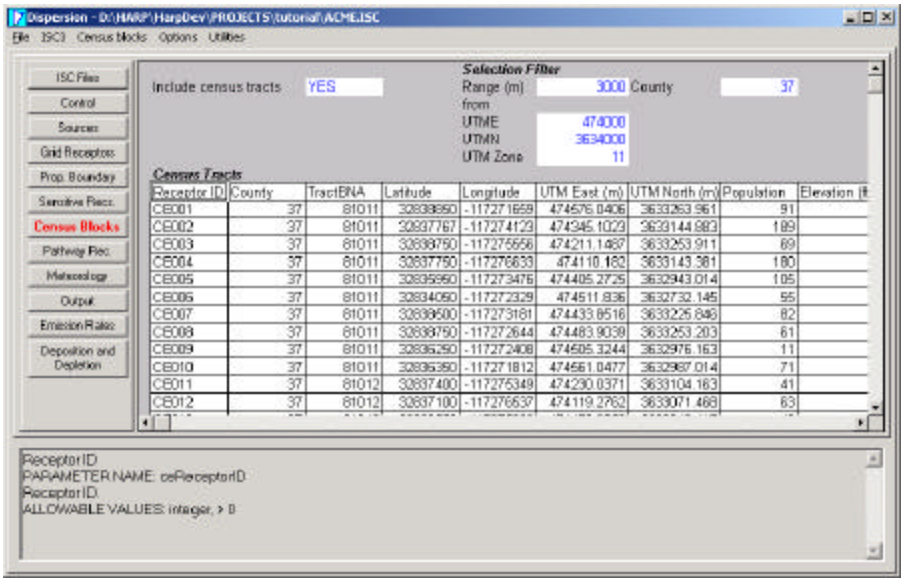
- Fill in the source IDs as before.
- Select ***Sensitive Receptors/Fill in Elevations***. This presumes that you have already opened the DEM files as described in the previous section.
- The window should now appear as shown below.
- Select *File/Save*.



4.6.8 Defining Census Block Receptors

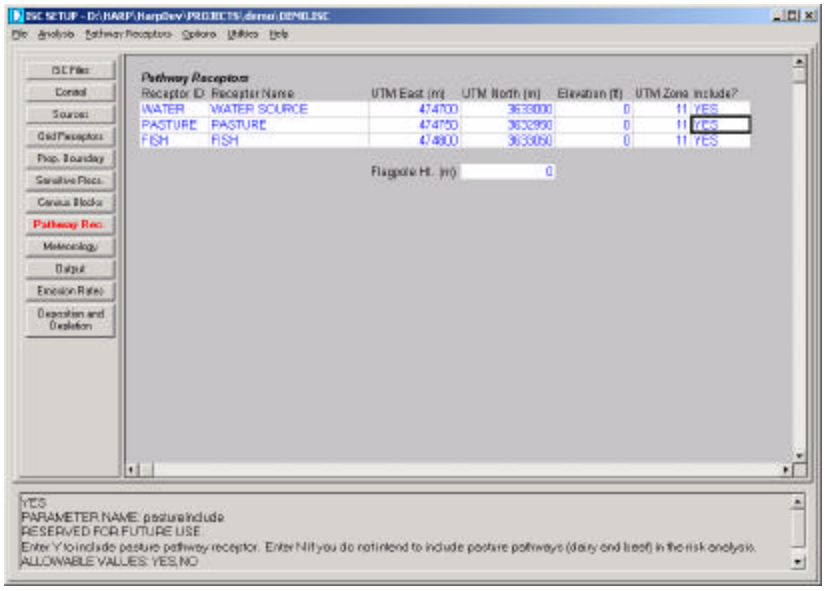
- Census block receptors are used to calculate population exposure and cancer burden.
- Click the ***Census Blocks*** button.
- Set ***Include Census Blocks*** to YES. If this is NO, then all of the information on this sheet will be ignored and no sensitive receptors will be included in the analysis.
- Select ***Census Blocks/Delete All Census Receptors.*** The census receptor sheet will be cleared.
- Enter the county and UTM coordinates as shown below.
- Select ***Census Blocks/Insert Receptors Using Selection Filter***
- The table will be populated with the census block data. The table will contain all census block receptors from San Diego County that are within 3000 meters of the specified UTM coordinates.

- Select ***Census Blocks/Fill in Elevations***.
- Scroll through the table to familiarize yourself with the contents. All of the text in blue can be manually edited. The elevations are in the column on the right.
- Select ***File/Save***.



4.6.9 Defining Pathway Receptors

- There are three pathway receptors. These are required for the risk analysis.
- Click the ***Pathway Rec***. button.
- Fill in the UTM coordinates of the water source (drinking water for humans, chickens and pigs)
- Fill in the UTM coordinates of the pasture (the location of beef and dairy cattle, their drinking water, and their pasture-grown feed)
- Fill in the UTM coordinates of the fish (locally caught fish)
- Set the ***Include?*** column on the far right to "YES" if you intend on running a multipathway health risk analysis with this air dispersion run.
- Select ***File/Save***.



4.6.10 Setting Meteorology Parameters

At this point it is worthwhile becoming somewhat familiar with the contents of a meteorology file. A standard ASCII format MET file looks like the following

```
99999    99  99999    99
99 1 1 1     0.0     1.0 293.0 1  320.0  320.0
99 1 1 2     0.0     1.5 293.0 1  480.0  480.0
99 1 1 3     0.0     2.0 293.0 1  640.0  640.0
99 1 1 4     0.0     2.5 293.0 1  800.0  800.0
99 1 1 5     0.0     3.0 293.0 1  960.0  960.0
99 1 1 6     0.0     1.0 293.0 2  320.0  320.0
99 1 1 7     0.0     1.5 293.0 2  480.0  480.0
99 1 1 8     0.0     2.0 293.0 2  640.0  640.0
99 1 1 9     0.0     2.5 293.0 2  800.0  800.0
99 1 110     0.0     3.0 293.0 2  960.0  960.0
99 1 111     0.0     3.5 293.0 2 1120.0 1120.0
(continues one record for each hour)
```

The first line contains the station number and year for the surface station and the upper air station. In the screening met file that is shown above, the station number is set to 99999 and the year is set to 1999.

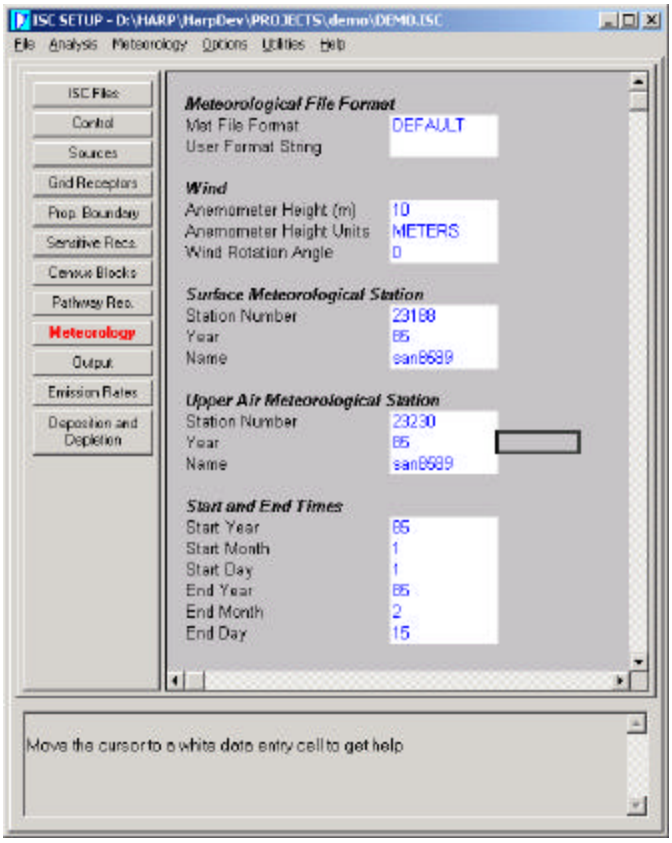
The remaining records in this file each contain 10 values, which represent the following:

1. the year
2. the month
3. the day
4. the hour

5. the wind direction in degrees
6. the wind velocity
7. the air temperature (K)
8. the stability class (A=1, B=2,…,F=6)
9. rural mixing height (m)
10. urban mixing height (m)

You must provide the station number and year as input to ISCST3. This is used for internal error checking. You must also provide a time range of data that you want processed.

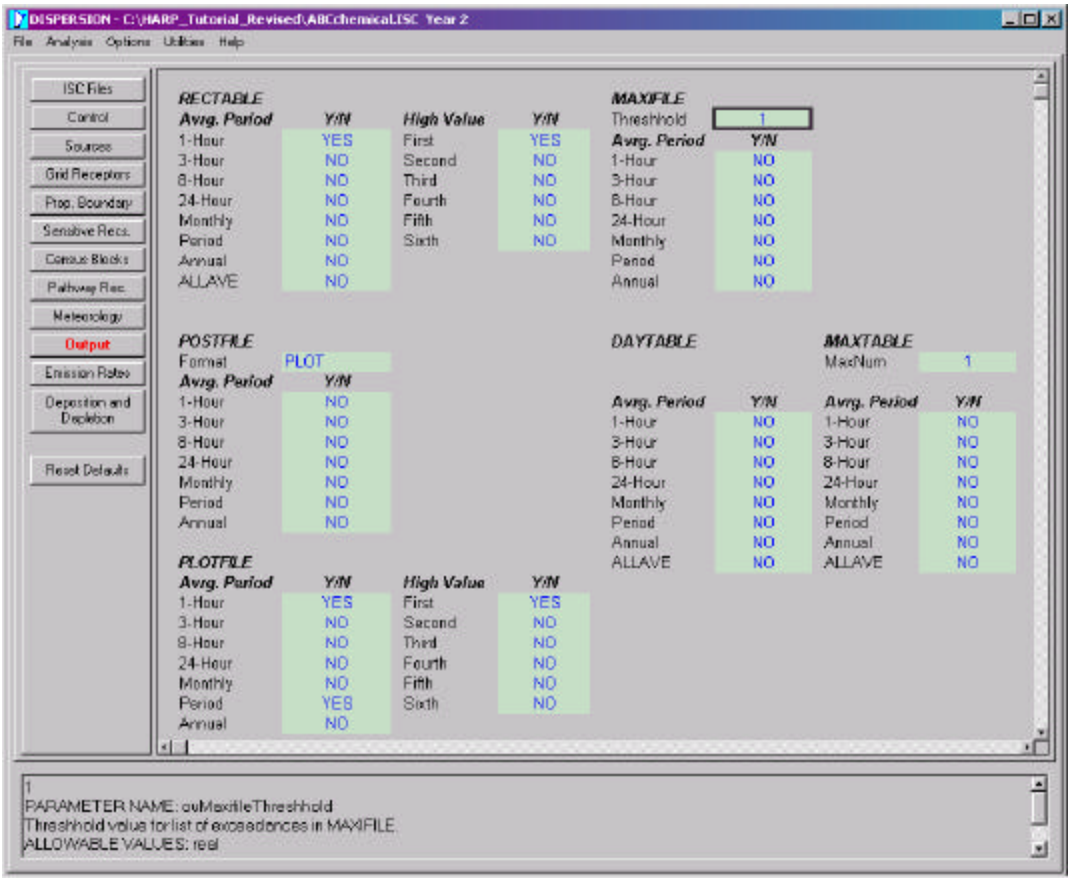
- ➢ To load a representative meteorology file into HARP, click the *Meteorology* button on the left side of the window.
- ➢ From the menu at the top of the window, select ***Meteorology/Open Meteorology File***.
- ➢ Open the file SD8589.MET.MET. If it is not in your directory, copy it from the HARP main directory. You can also browse to its location in another directory. However, the directory path must not be too long. ISCST3 does not like long path names.
- o HARP will read the met file and automatically fill in the station numbers and start and end times on the workbook.
- ➢ Edit the start and end times as shown below to use only one and a half months of meteorology data. The time range for the simulation will be January 1, 1985 to February 15, 1985. This is a very short time period to keep the run short for demonstration purposes. Normally, you should specify one to five years of met data
- o If you choose to use screening meteorology, open the dispersion module by choosing ***Analysis/Dispersion Analysis (Screening met data***). HARP will automatically load the screening met file from the HARP main directory.
- o The ***Met File Format*** for the sample MET files are all DEFAULT, which is the standard ASCII format. Several other file formats are available. Refer to the help pane at the bottom of the window and the ISCST3 manual for details. The other parameters are described in the ISCST3 manual and in Appendix F.
- ➢ Select ***File/Save***.



4.6.11 Defining Output Control Parameters

The *Output* parameters control what output is generated by ISCST3. This is organized into four files with different formats, the POSTFILE, the PLOTFILE and the MAXIFILE and the main ISCST3 output file. These are described in the ISCST3 manual.

The contents of these four standard ISCST3 output files are not used by HARP. However, you can choose to have HARP create and save these files. To view outside of HARP you will need to open them in a word processor. The version of ISCST3 that is delivered with HARP has been modified to generate additional output in a more convenient format for post-processing. There are two additional output files used by HARP, the SRC (source-receptor file) and the BIN (binary hourly data file). These are described in section 4.6.16.



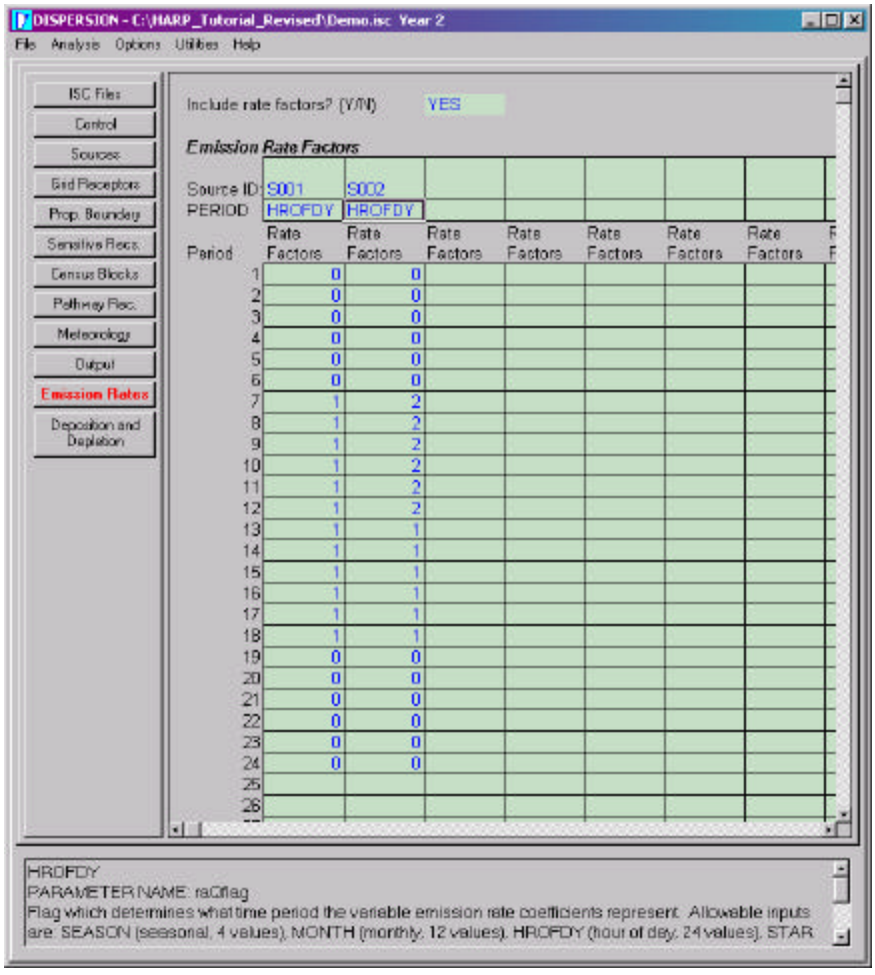
- Click the ***Output*** button.
- Scroll through the *Output* sheet and familiarize yourself with the output options. Read the description of each parameter in the help pane at the bottom of the window. Note the name of the ISCST3 parameter, and refer to the ISCST3 manual and Appendix F of this manual for details.

o It is important to note that some of these output options are dependent on the control parameters. For example, to generate POSTFILE output for a 24-hour averaging period, you must set the 24 averaging time to YES on the *Control* sheet. Otherwise ISCST3 will generate an error and fail.

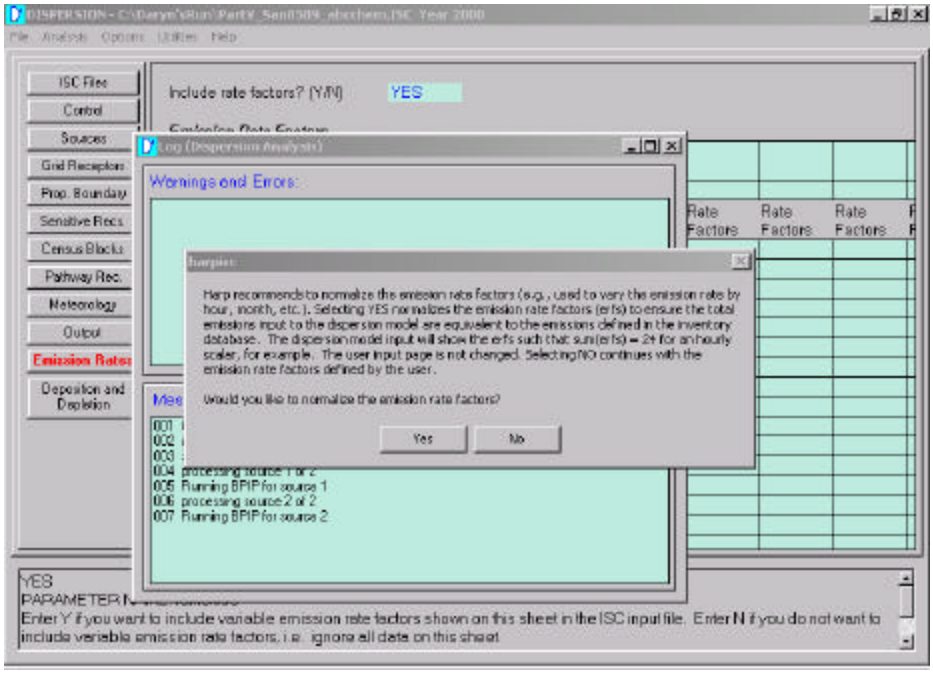
o Warning: the POSTFILE options may generate huge files and substantially increase the run time.

4.6.12 Emission Rate Factors

- This function is only available when using representative meteorology.
- It is important to synchronize diurnal emissions with hourly meteorological conditions. Meteorological conditions vary during the course of a 24-hour period and throughout the year. Incorrectly assigning emissions to the wrong part of a day will result in inappropriate assessments of downwind dispersion, impacts, and ?/Q.
- For example, ABC Chemical may have two emission sources. Source A is fugitive and emits 12 hours a day at a constant rate when the workers are at the shop. Source B is a function of operating hours but is twice as high in the morning because the machinery operates better in the morning. Therefore in the emission factor worksheet, Source A will have a period of HROFDY. 24 factors are required for HROFDY and the user will enter 0,0,0,0,0,0,1,1,1,1,1,1,1,1,1,1,1,1,0,0,0,0,0,0 to represent the fugitive emission rate profile. Source B will have a period of HROFDY. The user will enter 24 values for Source B as follows: 0,0,0,0,0,0,2,2,2,2,2,2,1,1,1,1,1,1,0,0,0,0,0,0. The emission factor of 2 represents twice the emissions in the morning as compared to the afternoon emission factor of 1.



- Click the ***Emission Rates*** button.
- Enter YES next to *Include rate factors.* If this parameter is NO, then the rest of this sheet will be ignored and no rate factors will be applied. This is the equivalent of setting the rate factors to 1 for all stack and periods.
- Enter S001 for the ***Source ID*** in the first column. (Make sure that this is the Source ID number for stack 1 of ABC Chemical.)
- Enter a ***PERIOD*** of HROFDY.
  - This indicates that you will enter 24 hourly rate factors in the column below. Other intervals besides HROFDY may also be entered, as indicated on the help line at the bottom of the window. The number of rate factors that you enter must correspond to the interval that you specify: 12 values for MONTH, 24 values for HROFDAY, etc.
- Enter the rate factors as shown.
  - Note that for our demonstration we have set the to *Include rate factors* parameter to NO. We are only including this in the tutorial to show how you would enter the emission rate data.
- Select ***File/Save***.
  - When you include an emission rate profile you will get a message about normalizing your emission rate factors when you run ISCST3. HARP expects the correct number of factors for the appropriate adjustment period. In order for HARP to coordinate the annual emission rate in tons/year with the emission factors, HARP will normalize the factors. In the case above for Source B, the 0's will remain 0's, the 2's will become 2.67, and the 1's will become 1.33. In this manner, the sum of the emission factors equals the number of values required (e.g., 24 in this case).
- Click on YES when asked the question, "Would you like to normalize the emission rate factors?"



4.6.13 Setting Elevations for All Sources and Receptors

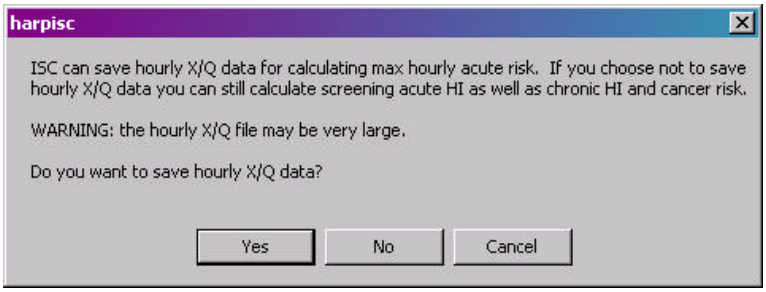
You have already seen how to insert elevations from DEM files for specific sets of receptors. You can also do this for the entire ISCST3 workbook in one step.

- ➢ If you have not already done so, open the DEM files by selecting ***Files/DEM/Open File.***
- ➢ Select ***Utilities/Look up all elevations*** from the menu.
- o HARP will populate all sheets on the workbook with elevations extracted from the DEM files. The DEM files must already be open.
- ➢ Click the ***Sources*** tab and note that the elevations of the stacks have been updated.
- ➢ Select ***File/Save***.

4.6.14 Running the Dispersion Model

- ➢ Select ***Analysis/Build ISCST3 Input and Run***.
- o You will be prompted with a window as shown below. You should respond Yes if you intend to do refined hourly acute risk. Otherwise respond No. Refined hourly acute risk provides a more accurate and less conservative estimate of acute risk. However, it requires storing the hourly X/Q values for every hour and for every source receptor combination. This can be a very large data file.
- ➢ For this example, you should respond, "YES".
- o HARP will build an ISCST3 input file and immediately run ISCST3.

- A log window will appear that shows the progress of HARP. HARP will run BPIP as required and display progress messages for each run in the log window.
- To abort an ISCST3 run, click on the command window and press Control-C.



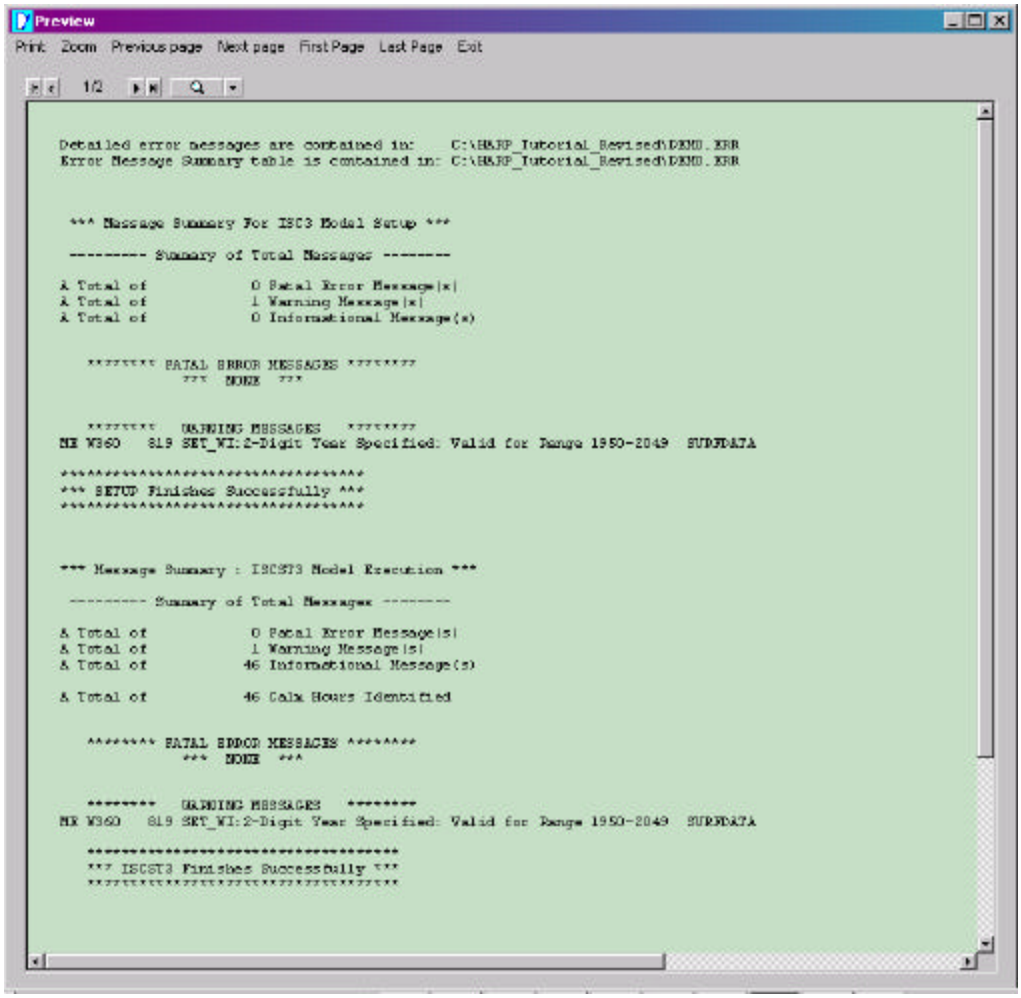
4.6.15 Checking for Errors

- If errors occur, error messages will be written to a file whose name matches the ISC input file name, but with the extension changed to .ERR. All messages will also be displayed by HARP in a preview window as shown below. ISCST3 error messages should always be heeded, because they may indicate a problem or inconsistency in your input. For further details on error messages refer to the *User's Guide for the Industrial Source Complex (ISC) Dispersion Models* that is included on the installation CD.
- There is an Y2K warning that will appear after every run of ISCST3 in HARP. This warning looks like this:

  ******** WARNING MESSAGES ********

  ME W360 1033 SET_WI:2-Digit Year Specified: Valid for Range 1950-2049 SURFDATA

  This warning occurs if the meteorology file contains years with only two digits. ISC resolves the ambiguity by interpreting this to mean the years are in the range of 1950 to 2049. In other words, 02 is interpreted as 2002, not 1902.
- In the example below, ISCST3 is warning you that calm hours (i.e. no wind) have been detected in the meteorology data. This is only a warning.



4.6.16 Understanding the ISCST3 Input and Output Files

All of the files generated by ISCST3 will have the same root name that you enter in the *ISC Files* window in the *ISC Input file* box (for example DEMO). Each ISCST3 file will have different 3-character extensions. The file extensio ns of the standard ISCST3 output files are listed below

INP The primary input file for ISCST3. This file is generated by HARP when you select ***ISCST3/Build ISCST3 Input File*** **or** ***ISCST3/Build ISCST3 Input and Run*** from the ***Dispersion*** window menu.

OUT The primary ISCST3 output file. This file contains an echo of the input, a summary of the results, and error messages. Error and warning messages are always located at the end of the file and can be viewed with any text editor.

PST This is the ISCST3 POSTFILE. It is created by ISCST3 and contains data in a format that is intended to be relatively easy to import into other programs for analysis and plotting, although in practice some editing of the file or coding of the import routines will be required. The format is ASCII, fixed column width and contains UTM coordinates and concentration values. The exact content of the file depends on what you choose for

the *Output* parameters on the *Dispersion* window. The values listed are the average values of concentration for all receptors at intervals that you specify.

PLT The PLT is very similar to the PLT file. In addition to average concentration values it also contains the so-called HIVALUs, which are the highest concentration values for all receptors for specified averaging periods.

MAX The so-called MAXIFILE, contains a list of all receptors whose concentration values exceed some specified threshold during the simulation. The file is generated by ISCST3 according to the parameters that you specify on the ***Output*** control sheet of the *Dispersion* workbook. Consult the ISCST3 manual for details.

ERR The error file is generated by ISCST3 and contains a list of all warning and error messages generated by the program.

The version of ISCST3 that is used by HARP has been modified to provide additional post processing and output that is necessary to carry out risk analysis. No changes have been made to the standard files or the algorithms in ISCST3. This version of ISCST3 generates the following additional files.

SRC This file is called the Source-Receptor file. It is generated by HARP at the time that the ISCST3 input file is built. The SRC file is a critical file that ties together the all of ISCST3 output files with the HARP database. This file is necessary because the format of the ISCST3 input file does not allow the inclusion of information that is essential to the risk analysis. For example, the ISCST3 input and output files do not provide a way to distinguish between grid receptors, sensitive receptors, and other receptor types. The ISCST3 input and output files also do not allow for more than a single emission rate for each source. Because a source may emit several different chemicals this constrains how the ISCST3 results are used. The SRC file tells the risk analysis module which sources and receptors in the HARP database correspond to the sources and receptors that were modeled by the dispersion analysis.

XOQ This file is generated by ISCST3. It contains the average and maximum X/Q values for each source receptor combination. The maximum X/Q values are calculated for various averaging times. This is required for risk analysis because different chemicals have acute reference exposure levels based on different averaging times. HARP automatically uses the correct averaging time for each chemical. The XOQ file is generated by ISCST3 by means of additional post processing routines that have been added to the version of ISCST3 that is delivered with HARP.

BIN The BIN file is generated by ISCST3 and holds binary X/Q information for every source/receptor combination for every hour of the simulation. It is similar to the ISCST3 POSTFILE, however the information is in a more structured format that makes it more suitable for post-processing. Unlike the POSTFILE, the BIN file format and contents are independent of the output options that you choose, which also make it simple to process. The data in the BIN file is used for the detailed acute risk analysis, which requires an hour-by-hour calculation of acute risk for the entire duration of the ISCST3 run. The BIN file can be quite large for long simulations and large numbers of sources and receptors.

4.7 Track 7 – Point Estimate Risk Analysis and GIS

4.7.1 Getting Started, Loading Data Files

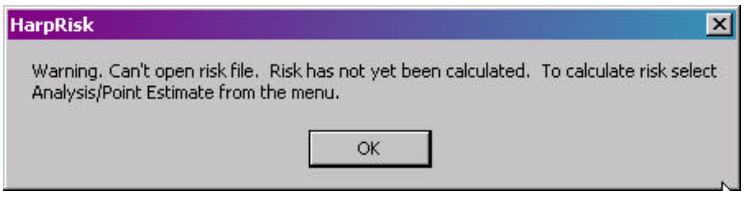
This section explains how to open the data files that are needed to carry out the risk analysis. As described in the previous section, the SCR file (source-receptor file) is the key file that ties all the other files together by providing cross-referencing information. For example, it contains information that can be used to associate each emission source used in the dispersion analysis to specific stacks in the HARP database.

Other data files that are important to carrying out the risk analysis and understanding the results are street map files and digital elevation model files.

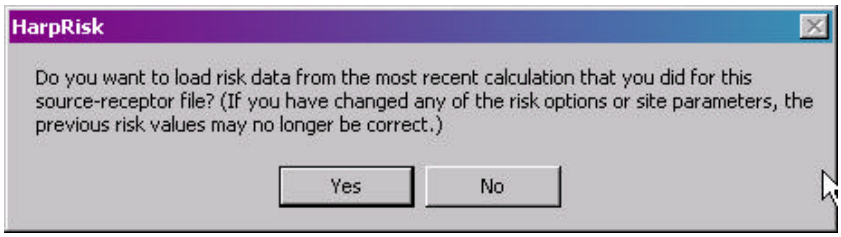
Finally, the RSK file is an intermediate file that HARP uses to store the most recent cancer risk and noncancer health effects for all receptors. This file can be opened automatically when you return to a SRC file that you have previously analyzed so that you can reprocess and visualize the results without redoing the calculations.

The following steps show how to open these important files. The example used in this tutorial is for a risk analysis using representative meteorology data. In this example we will assume that the data has not been analyzed before. For information on using screening meteorology and loading existing risk data, see chapter 10.

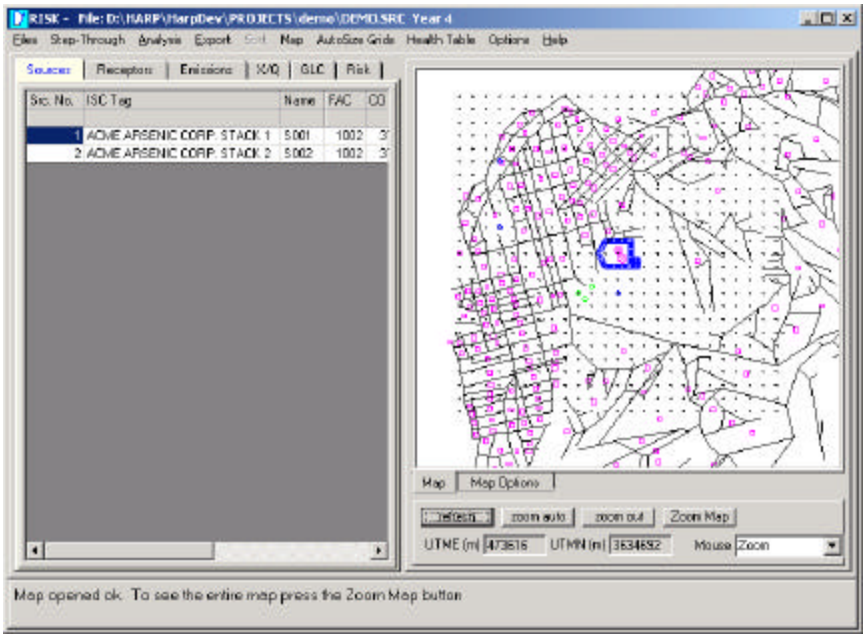
- From the HARP main menu, select ***Analysis/Risk Analysis (Representative Met Data)***
  - There are two choices in the menu depending on whether you intend to use screening meteorology data or representative (actual) meteorology data. Your choice will be depend on what meteorology you used in the dispersion analysis. If you used representative meteorology, you must choose ***Analysis/Risk Analysis (Representative Met Data)***.
  - The *Risk* window will be displayed, but the window does not yet contain any data.
- Select ***File/Open Source/Receptor File (Dispersion analysis results)***. When prompted for a file name, select ABCCHEM.SRC or DEMO.SRC.
  - The log window will appear, showing the progress as HARP reads the SRC file and the XOQ file. HARP will then attempt to read the RSK file, but since no risk values have been calculated for this SRC file you will see the following message displayed.



- If risk values have previously been calculated using this SRC file, HARP will ask if you want to load the most recent risk calculations associated with this SRC file. If you are going to do more calculations using this data, choose NO. But if the point estimate risk data calculations are complete and you are viewing, printing, or conducting a stochastic analysis, choose YES.



- The left pane of the window shows detailed information about all the sources and receptors that were used in the dispersion analysis.
- The right side of the window shows a map of all the sources and receptors that were used in the analysis.



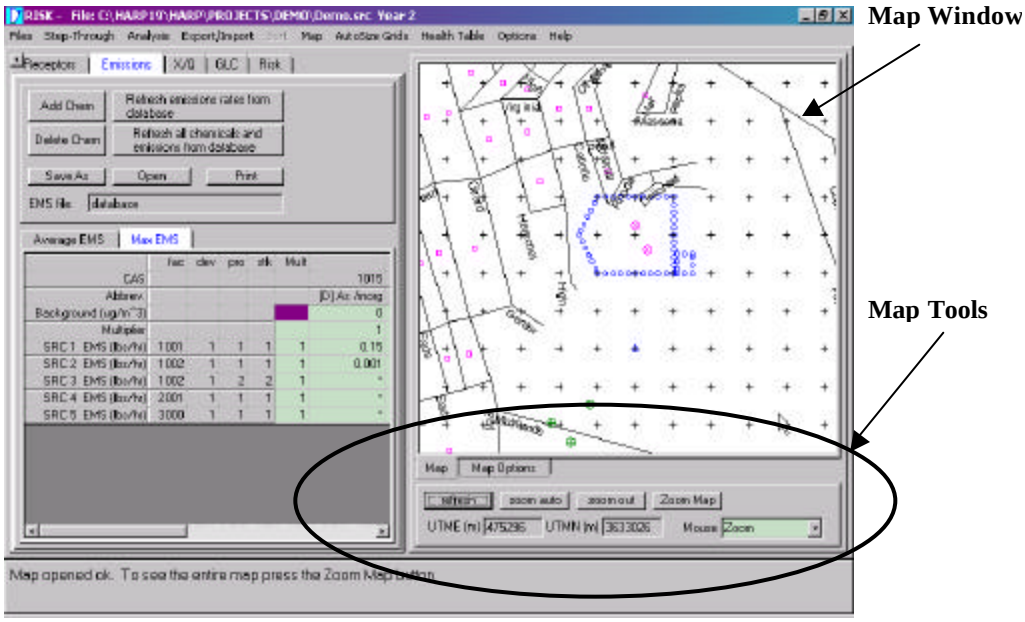
- To speed up the loading of the SRC file and the subsequent calculations, HARP will automatically hide the X/Q and GLC values. When you want these values to be displayed, uncheck the menu item under ***Options/Display GLC and X/Q Details***. When this item is checked, the GLC and X/Q values will be displayed immediately.

➢ Select ***Files/Open Map File***.

- When prompted for a file, browse to the \HARP\MAPS\utmnad83\ directory and select SanDiego.map
  - After a few moments the street map for San Diego county will appear
- Click the ***Zoom Auto*** button.
  - This will zoom the map to a scale that will just show all of the sources and receptors that were in the SRC file. The window should now appear as shown below.
- Select ***Files/Digital Elevation Model/Open Most Recent DEM Files***.
  - After a few seconds you will see the message "Files Opened OK"
  - If you have been following the entire tutorial up to now without exiting HARP, the DEM files will already be opened, so you can skip the previous step. If you want to see what files are currently open, select ***Files/Digital Elevation Model/List All Open DEM Files***.
  - Opening a DEM file is not crucial for subsequent steps in the tutorial. It is only used to display elevation data for your own information. The primary importance of the DEM data is in setting up the dispersion analysis, which was already done.
  - You have now opened all of the files that are needed for the analysis.

4.7.2 Navigating the Map and Data on the Risk Window

The Map window on the right side of the risk window, will graphically display the building and property boundaries, stack locations, receptor locations, elevation and risk contours, and street maps. On the bottom right there is a menu option for the mouse functions. From here you can activate the mouse to zoom or pick receptors or sources. *Refresh* will redraw the map. *Zoom auto* will zoom the map to show the source and receptor data. *Zoom out* will show more of the map. *Zoom map* will show the entire map.



Map Legend:

○ Blue circles on the map are the property boundary receptors

Ä Sources (stacks) are shown on the map as magenta circles with X's in them

\+ Black plus signs mark the location of grid receptors.

□ Magenta squares mark the centers of the census blocks.

Å Green circles with plus marks in them mark the locations of pathway (sensitive) receptors.

△ Blue triangles mark the locations of sensitive receptors.

- Drag the mouse around a small section near the middle of the map to zoom in around the cluster of blue circles near the center of the map. These receptors are the property boundary receptors.
- At the bottom of the map window, click on the ***Map Option*** tab. This tab displays all of the controls for the map window. Check the boxes labeled ***Properties*** and ***Bldgs***. These cause property and building boundaries to be shown on the map as dotted lines.
- Click the ***Refresh*** button to redraw the map
  - Building and property boundary lines are now displayed. This information was automatically looked up by HARP from the database. The SRC file contains the cross-reference information that enables HARP to do this.
- At the bottom right corner of the map window is a drop-down list labeled ***Mouse***. Select ***Pick Receptor***.
- Click on one of the grid receptors on the map. The grid receptor is highlighted on the left pane of the window.
- Click on one of the property boundary receptors.
- Click on a census block receptor.
- From the drop-down list labeled ***Mouse***, select ***Pick Source***.
- Click on a stack.
- From the drop-down list labeled ***Mouse***, select ***Show Elevation***.
- Click on any location on the map. The elevation is shown on the bottom left corner of the risk window.
- Click the ***Zoom Out*** and ***Zoom Map*** buttons to see the effects.
- On the left pane of the window, select the ***Sources*** tab.
- Click on one of the sources
  - Note that the source is highlighted with a large cross hair on the map pane. If the cross hair is not visible, try zooming out to a smaller map scale.

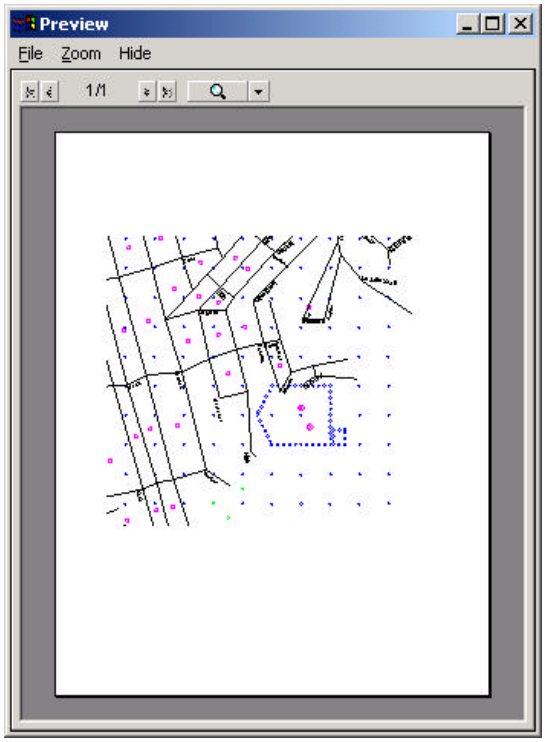
- o If the map has been cleared, click the ***Refresh*** button.
- ➢ On the left pane of the window, select the ***Receptors*** tab. Then click one of the sub-tabs.
- ➢ Click on one of the receptors.
- o Note that the receptor is highlighted with a large cross hair on the map pane. If the cross hair is not visible, try zooming out to a smaller map scale.

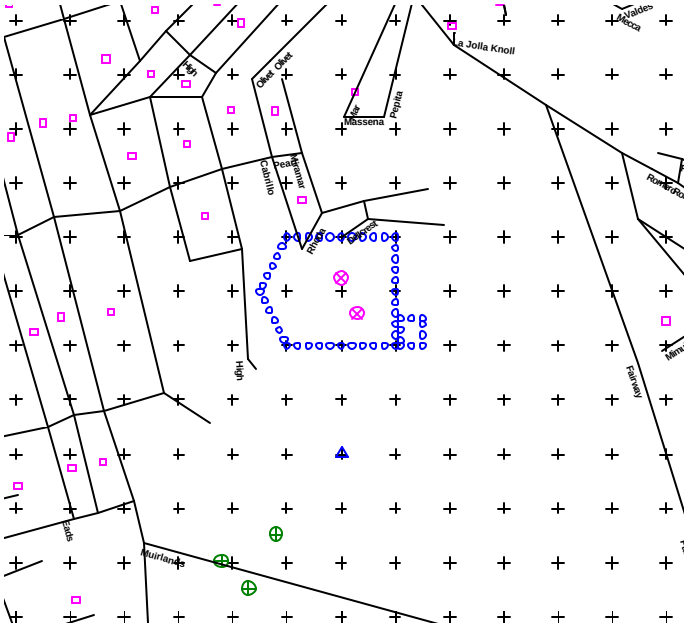
4.7.3 Locating and Labeling Streets

- ➢ Under the map pane click on the ***Map Options*** tab, check the box labeled ***Street Names***.
- ➢ Click the ***Refresh*** button.
- o The street names will be displayed on the map.
- o Note**:** when the map is being redrawn, a ***STOP*** button will appear in the lower right corner. Press this button if you want to stop the drawing. This may be important if you have the street names shown and you accidentally click ***Zoom Map***. Try this and you will understand the need for the ***STOP*** button.
- ➢ Change the font size to 10 and click *Refresh* to enlarge the street labels.
- ➢ Change the ***Name frequency*** to 1 and click refresh.
- o This causes every intersection to be labeled with a street name. To reduce the labeling frequency to every other intersection, change the frequency to 2. For every third intersection, change it to 3, and so forth. The larger the number, the less frequent the names will be plotted.
- ➢ Uncheck ***Street Names***.
- ➢ Zoom out to see all of the La Jolla area.
- ➢ On the ***Map Options*** window, enter the name PROSPECT in the space next to ***Search***.
- ➢ Click ***Refresh***.
- o This feature is used to locate a street on a map when you only have the name.
- ➢ Click ***Zoom Map*** to see that there are several streets named Prospect in the San Diego area.
- o If you check ***Whole word only***, then only streets that exactly match the word you enter will be highlighted. This is essential, for example, to find a street such as "L" street, where there would otherwise be too many matches for practical purposes.
- ➢ Clear the space next to *Search* and then press ***Refresh*** to clear the highlight on Prospect Street.

4.7.4 Printing and Exporting Maps

- Adjust the drawing parameters as described in the previous section so that the map looks the way you want it to.
- Select ***Map/Print Preview***.
- The map will be displayed in a *Preview* window as shown below. From the *Preview* window you can select ***File/Print*** if you have a printer attached. The map will be printed exactly as it is shown.
- From the Map *Preview* window, select ***File/Copy to Clipboard***.
- Open Microsoft Word or any other word processor.
- Place the cursor in an open space in your Word document.
- Select ***Edit/Paste Special***. Then select, ***Enhanced Metafile*** to paste the map into your document.
- Use the Word cropping tool to remove the white space from the edges of the map. Then format the picture, choosing a wrapping style that will fit within your text.



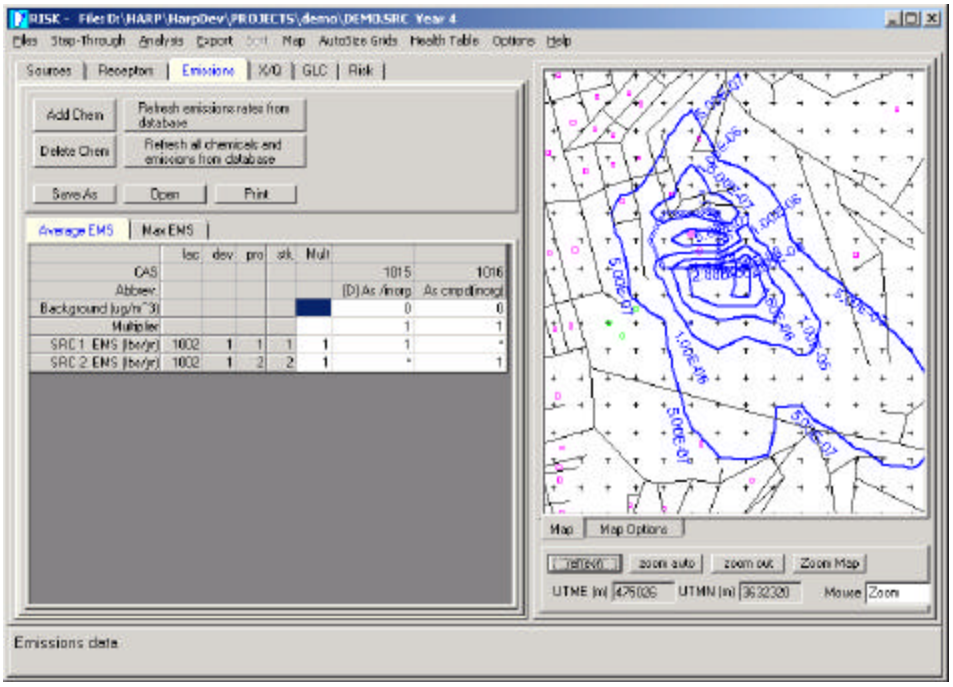


SAMPLE MAP INSERTED INTO WORD DOCUMENTS

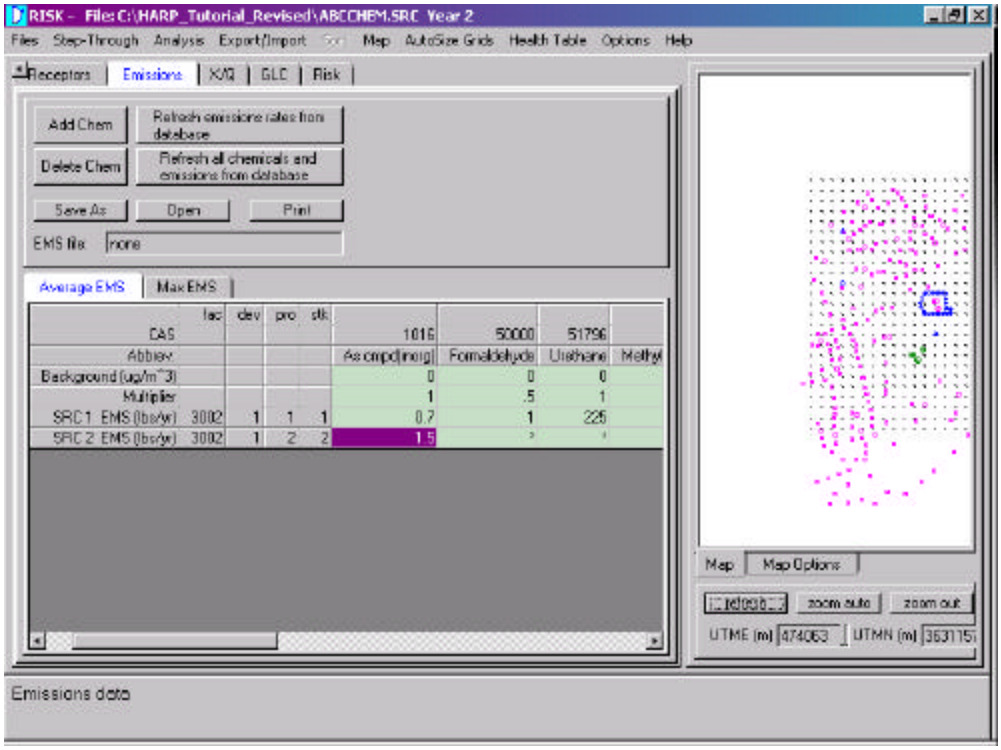
4.7.5 Editing Emissions Data

In all of the previous analysis, the emissions data that was used is automatically determined by the database. You have the option of overriding the emission rates when calculating risk, and adding or deleting chemicals. This is useful to test hypothetical scenarios and play "what if" games with the analysis. This section shows how to edit the chemicals and emissions used in the risk analysis without altering the permanent numbers stored in the database.

- ➢ Select the ***Emissions*** tab on the *Risk* window.
- o Note that you can resize the data and map panes by clicking on the thin vertical space that separates the two panes and dragging to the right or left.
- o The *Risk* window should appear similar to what is shown below
- o The row in the table labeled ***Mult*** is a set of user-specified factors that multiply the emission rates in each column
- o The column in the table labeled ***Mult*** is a set of user-specified factors that multiply the emission rates in each row.
- o The other values in the table are the emission rates that were loaded automatically from the database when the SRC file was opened.
- o An asterisk in any cell means that there is no emission rate specified in the database for the corresponding chemical and stack.
- o A particular stack may appear more than once in the table, since it is possible to have two processes that emit through the same stack.



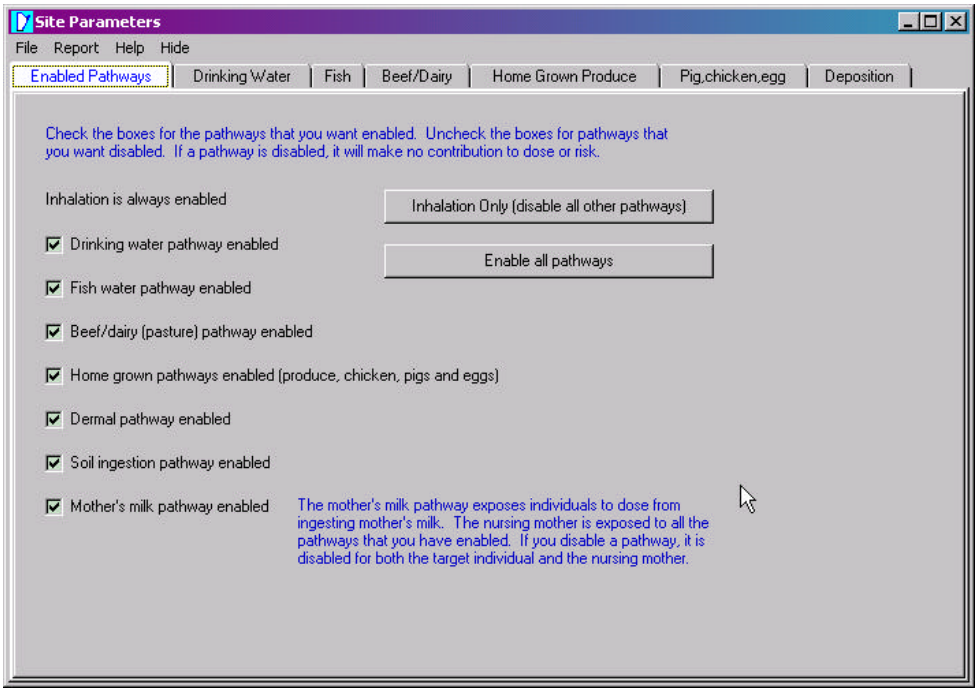
- Suppose stack 2 emits chemical 1016 at an annual rate of 1.5 lbs/year. Enter 1.5 in the appropriate cell.
- Suppose emissions of chemical 50000 are reduced by half in our hypothetical scenario. Enter 0.5 in the column under 50000 in the row labeled ***Mult***. This reduces the emissions of 50000 by half for all stacks.
- Suppose stack 2 also emits Cadmium (CAS 7440439) at a rate of 2 lbs/year.
- Click ***Add Chem***.
- Click on ***NAME*** under the search function. Scroll down and select Cadmium (CAS 7440439) from the list. (Don't use substances with a [D] Deleted/obsolete if you can avoid it.)
- Enter a value of 2 in the appropriate cell. The window should now appear as shown below.
- Recalculate the cancer risk and determine the PMI and associated risk. Note the increase in cancer risk.
- Generate a detailed point estimate report for the receptor with the highest cancer risk to determine the relative contributions to risk of the three chemicals.
- Generate a detailed point estimate report for the same receptor, with breakdown by source, to determine the relative contributions to the risk from each of the two stacks.
- The row labeled ***Background*** allows you to enter background concentrations (micrograms/m^3) for each of the listed chemicals. This background concentration is added to the total concentration at each receptor.
- Click the button labeled ***Refresh emission rates from database***.
- Note the emission rates for cadmium are replaced with asterisks. This is because this chemical is not listed in the database as an emission from either of these stacks.
- Click the button labeled ***Refresh all chemicals and emissions from database***.
- The data on the ***Emissions*** tab is replaced in its entirely be the original values. Only chemicals that you have specified in the HARP database for these stacks are now shown.
- The ***Save As*** and ***Open*** buttons allow you to save the changes that you have made to a file and later retrieve them.
- The ***Print*** button prints the contents of the ***Emissions*** table as it is currently shown to a file for reporting purposes.



4.7.6 Setting Site Parameters

The site parameters window describes the media, other than air, that might contribute to a health risk. You must provide this data to complete the input to the risk analysis. Set these parameters using the steps below.

- ➢ Select ***Analysis/Define Site Parameters*** from the *Risk* window menu.
- o HARP will load the last site parameters file that was opened.
- o Place a check in the box next to each pathway you wish to enable/disable for the risk calculation. Then click on each tab to view the entry screen for each pathway. Fill in the required information for each enabled pathway.
- ➢ Place a check in the box next to ***Dermal pathway enabled***, ***Soil Ingestion pathway enabled***, and ***Mother's milk pathway enabled***.
- o These are the three minimum pathways required for a multipathway analysis. No other information is required for these pathways.
- ➢ Select ***File/Save As*** to save the values you have defined to a file.
- ➢ Select the options as shown in the window below.



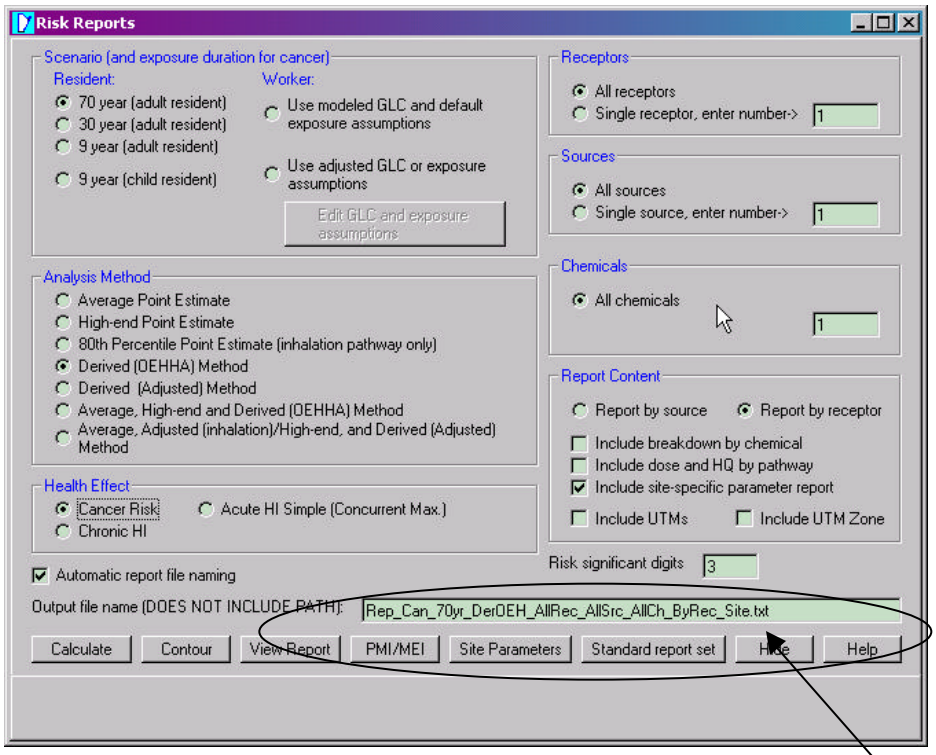
4.7.7 Averaging Period Adjustment Factors

Averaging Period Adjustment Factors are only used with screening meteorology. Therefore, they are not needed in the example presented in this tutorial.

When you use screening meteorology data for the air dispersion analysis the result is a one-hour X/Q value. U.S. EPA screening factors can be applied to estimate concentrations for longer averaging periods, such as the maximum annual average concentration. You can do this by selecting ***Analysis/Define Averaging Period Adjustment Factors for Screening Meteorology*** from the menu of the Risk window. For information on Averaging Period Adjustment Factors, see Chapter 10 and Appendix H.

4.7.8 Point Estimate Cancer Risk Analysis

- Select ***Analysis/Point Estimate (Includes Multipathway)***
- Select the options as shown in the window below.
- Click the ***Calculate*** button. HARP will show you a preview of the report. Close Report.



- When you run a risk calculation HARP will save the results in a file with a name that represents the analysis options you have chosen. If you later recalculate the same scenario, HARP will want to save the file with the same name and overwrite the first file. You can change the file name if you want to keep the first file.

➢ Return to the main ***Risk*** window and select the ***Risk*** tab

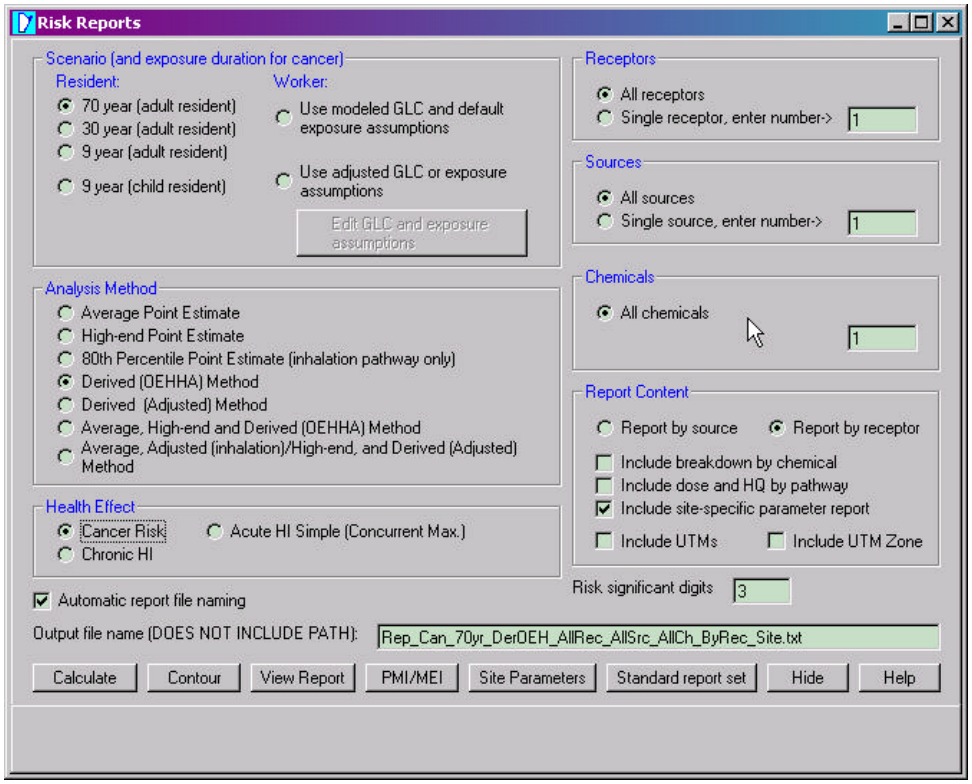
- The values under the ***Risk*** tab show the cancer risk for every receptor.

➢ Use the navigation steps described in the previous section to determine the cancer risk at any receptor.

- You may repeat these steps selecting different exposure durations and analysis methods by changing the options on this window.
- The ***GLC*** tab shows the values of GLC at each receptor used in the risk analysis.
- The ***X/Q*** tab shows the X/Q values for every source-receptor pair. These values are automatically read in from the XOQ file when you open an SRC file.
- **DON'T PANIC** - If no GLC and X/Q values are displayed. The option to have them visually turned-off is activated. On the main *Risk* window, select ***Options/Display GLC and X/Q details***.

The following steps will generate a detailed report for the receptor with the highest risk.

- Select the ***Risk*** tab.
- Click anywhere on the ***Cancer*** column.
- Select ***Sort/by Value***.
- This causes receptors in the list to be sorted in descending order of cancer risk. To resort them in the order of receptor number, select ***Sort/by Index***.
- Scroll to the top of the list and identify the receptor having the highest risk.
- Note the location of the receptor on the map.
- Return to the ***Risk Reports*** window. (If it isn't visible, select ***Analysis/Point Estimate*** from the ***Risk*** window.
- Select ***Single receptor***, and then enter the receptor number with the highest risk value in the space to the right.
- Select ***Include breakdown by chemical*** and ***Include dose and HQ by pathway***. (HQ = Hazard Quotient for noncancer calculations).
- Click ***Calculate***.
- When prompted to view the report, respond by clicking YES.
- The report is written to a file whose name you provide on the bottom of the ***Risk Reports*** window. This report can be printed directly from HARP or opened in a word processor. When printing from HARP you have the option of printing the current page or the whole document. Be observant. These reports can be very large.
- This report can be opened in a word processor. Once opened adjust the font type, font size, and margins to make the report easier to read when printed. One suggestion for font is Courier, 7 pitch.
- The report includes a detailed breakdown of risk by chemical and pathway.
- Repeat the above report, but this time select ***Include site-specific parameter report***. This causes a report of all the site parameters to be appended to the report file.
- Repeat the above report, but this time select ***Report by Source***. This allows you to view the breakdown of risk contribution by source. .
- If you choose to see the results broken down by chemical and pathway, you should not normally select ***All receptors***, since this would generate a very large report.
- If you check ***Include UTMs***, UTM coordinates for each receptor will be appended to each row of the report. This is intended for importing into an external GIS program for further post-processing.



4.7.9 Point Estimate Chronic and Acute Health Effects

The steps in calculating chronic or acute health effects are exactly the same as the previous section, except that you must select ***Chronic*** or ***Acute*** under the ***Health Effects*** section on the ***Risk Reports*** window.

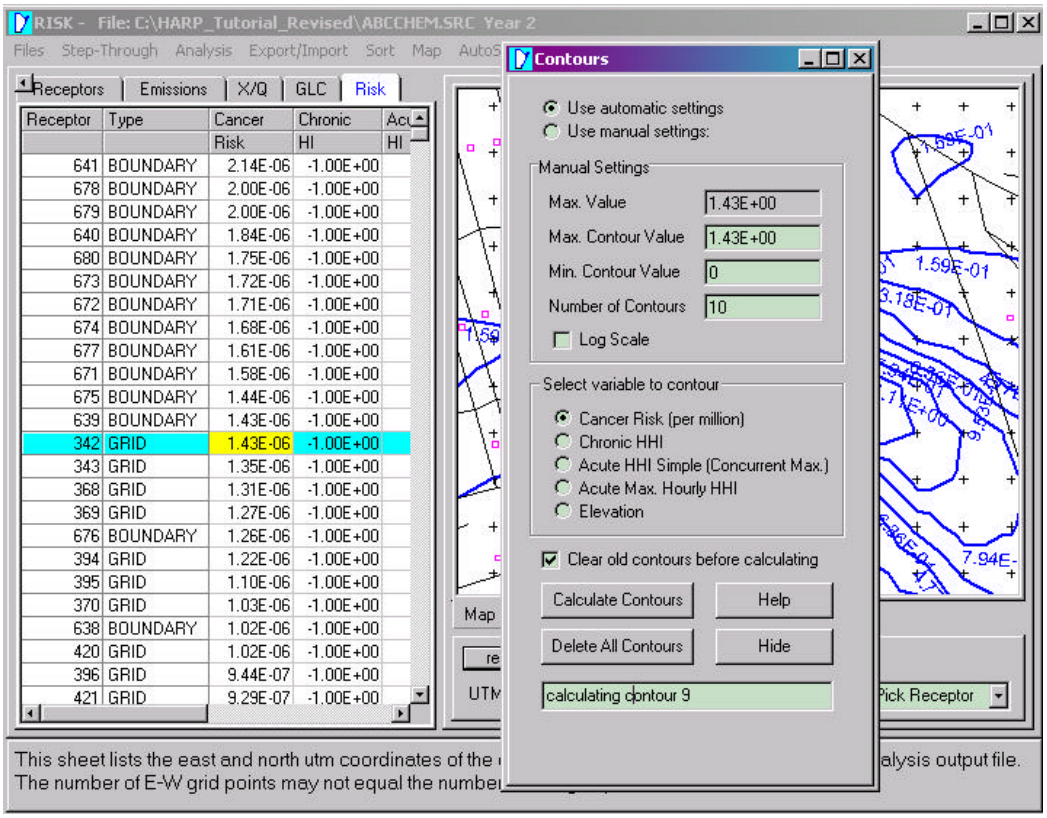
When you select either chronic or acute health effects, both are calculated. When calculating for all receptors, both chronic and acute values will be displayed under the *Risk* tab on the *Risk* window. When calculating for only a single receptor, the reports that are generated will be different for chronic and acute.

For acute and chronic health effects, the detailed reports are broken down by toxicological endpoint rather than by pathway.

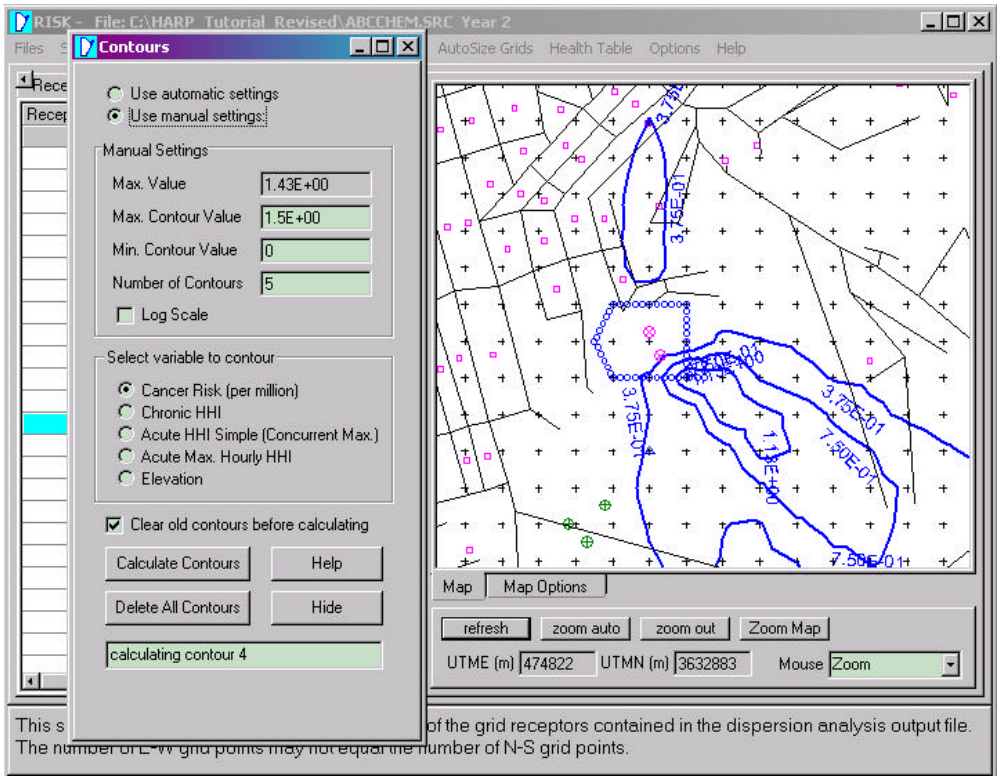
- On the ***Risk Reports*** window, select the button next to ***Chronic HI*** health effect. Select the analysis method you wish to run. Then press ***Calculate*** to generate risk results for chronic and acute. These results are needed for contouring and PMI/MEI reports in a later section.
- Note that chronic and acute results are always calculated together. Only the one that you select will show up on the printed report, but both will be displayed under the ***Risk*** tab.

4.7.10 Contouring

- From the ***Risk*** window, select ***Analysis/Contour***. The ***Contours*** window will appear, similar to that shown below.
  - **IMPORTANT:** The contour isopleths are generated by using **only grid receptors**.
  - **IMPORTANT:** HARP will plot the last risk that was calculated. So if you chose to run a risk analysis for "average, high-end and derived", the risk contours that will be plotted will be for "derived". If you ran the OEHHA standard report set, HARP will plot the 70-year, cancer, derived (adjusted) scenario from Report #19.
  - **IMPORTANT:** HARP plots contours in units of "per million".
  - By default, the box labeled "max value" will be populated with the highest cancer or noncancer health value for your analysis and the maximum contour level shown in the next box is set to the same value, while the minimum contour value is zero.
  - Using the automatic settings will create contours that bound the risk data between the highest risk value and zero. The number of contours that you define will divide the risk results into evenly spaced intervals between these two points.
- Select the button next to ***Use automatic settings***. Select ***Cancer Risk*** to contour the cancer risk. Click ***Calculate Contours***. The mapped results will appear on the Risk window.



- To manually identify the contours, check the box ***Use Manual Setting***.
- If you want to see just two isopleths at 1 and 10 chances per million: Set the ***Max. Contour Value*** to 10 and the Set ***Min. Contour Value*** to 1, and set ***Number of Contours*** to 2. Click ***Calculate Contours***. The contours will be displayed on the map when the calculation is done.
  - The number of contours should be one number greater than the number of intervals that you want your data divided into (i.e., if 5 intervals of data is desired, enter 6 contours).
  - If HARP will not calculate the contours, there may not be enough data. At least three points of data (grid receptors) at that contour range are needed to make an isopleth.
  - You should also look at your risk data to confirm that your maximum and minimum contour values are within the range of your data or you may need to rerun the dispersion analysis with smaller grid spacing.
  - The time required to create the contours is proportional to the number of contours and the square of the number of grid points. A 20x20 grid will take 16 times longer to contour than a 10x10 grid because it has four times as many grid points.
- Select ***Chronic Risk***.
  - Note that the *Max. Value* for chronic risk is now shown on the *Contours* window. This is for your information so you can decide on the appropriate ***Max. Contour Value*** **and** ***Number of Contours***.

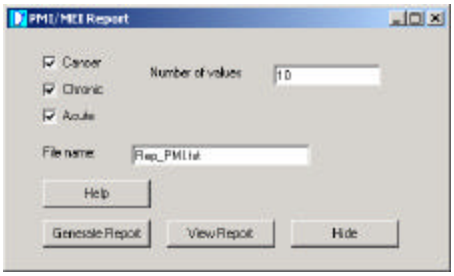


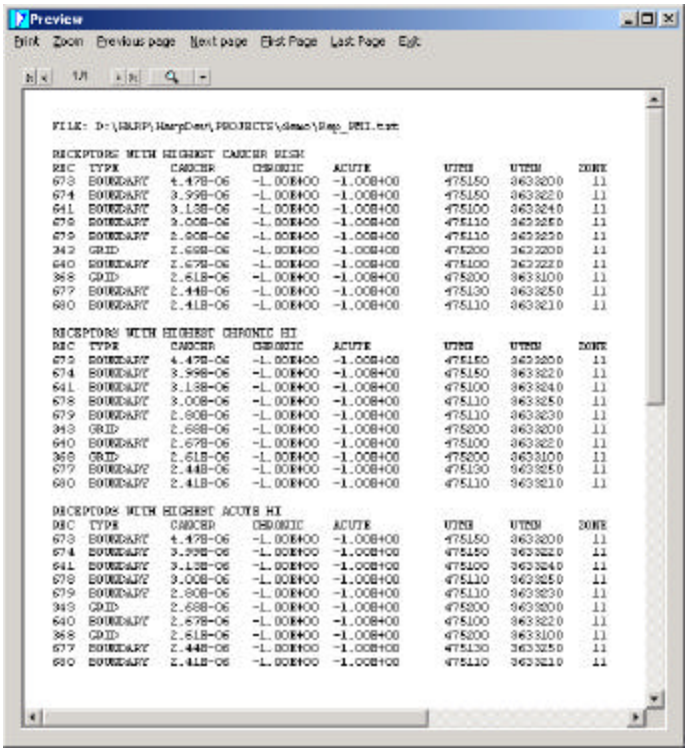
EXAMPLE CONTOUR

4.7.11 Calculating PMI/MEI

The PMI/MEI report provides a summary of the cancer risk and/or acute and chronic health effects at the most impacted receptors. HARP sorts the receptors in descending order of risk and displays the results as a table. These receptor points may be both inside and outside of the facility property boundary. Depending on the purpose (programmatic requirements) of your analysis or the nature of activities within the facility (e.g., prisons, universities, or military bases), care should be taken to be sure that the appropriate location for the PMI is reported. See the OEHHA Guidance Manual for information on when on-sight receptors may be appropriate under the Hot Spots Program. Assessors should understand the location of the PMI before automatically reporting the highest receptor as the PMI location.

- ➢ From the *Risk* window, select ***Analysis/PMI/MEI***
- o The ***PMI/MEI Report*** window will appear as shown below.
- o Set the number of values to 5. The report will then show the top 5 highest risk receptors in each category (cancer, chronic and acute)
- o The report will be written to the file whose name you specify. The file will be located in the project directory.
- ➢ Press the button labeled ***Generate Report***.
- o The report will be displayed in the preview window. You can print it directly from this window. Because the report is a plain ASCII file you can import it into any word processor or text editor.
- ➢ Return to the main *Risk* window. Sort the cancer risk values shown under the *Risk* tab. Click on highest risk receptor to see where it is located on the map. This is the PMI.

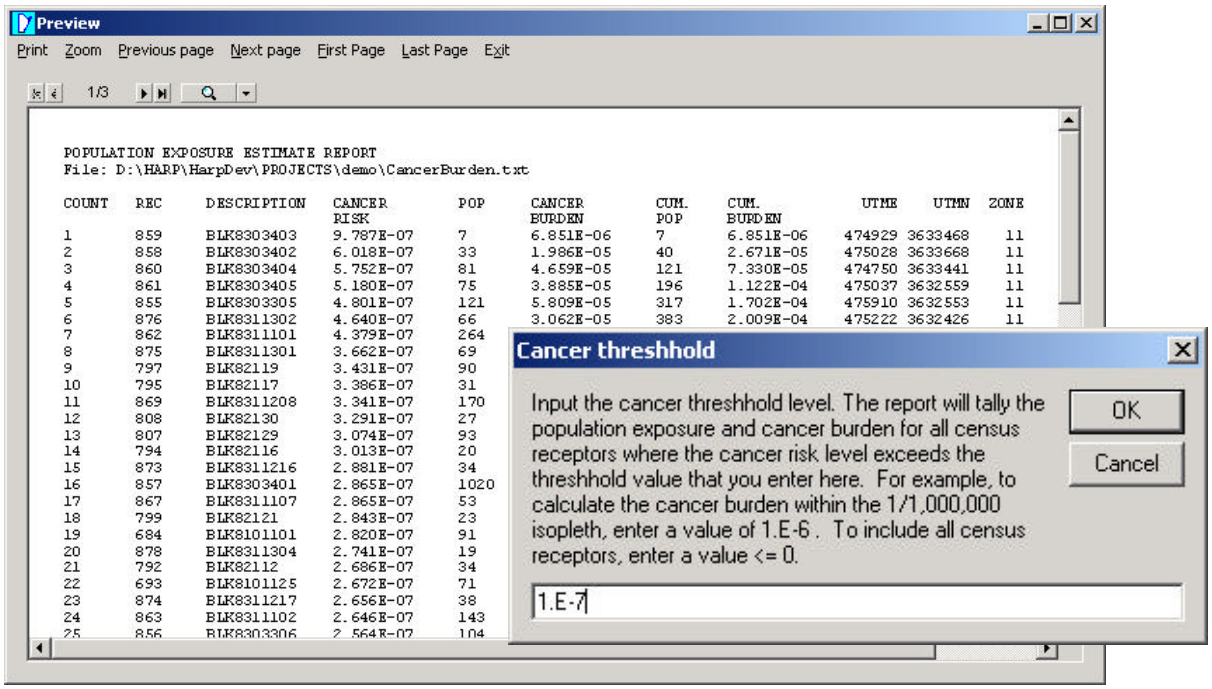




4.7.12 Cancer Population Exposure Estimate and Cancer Burden

The cancer burden report allows you to determine both the cancer burden and a count of the impacted population where the risk exceeds some specified value.

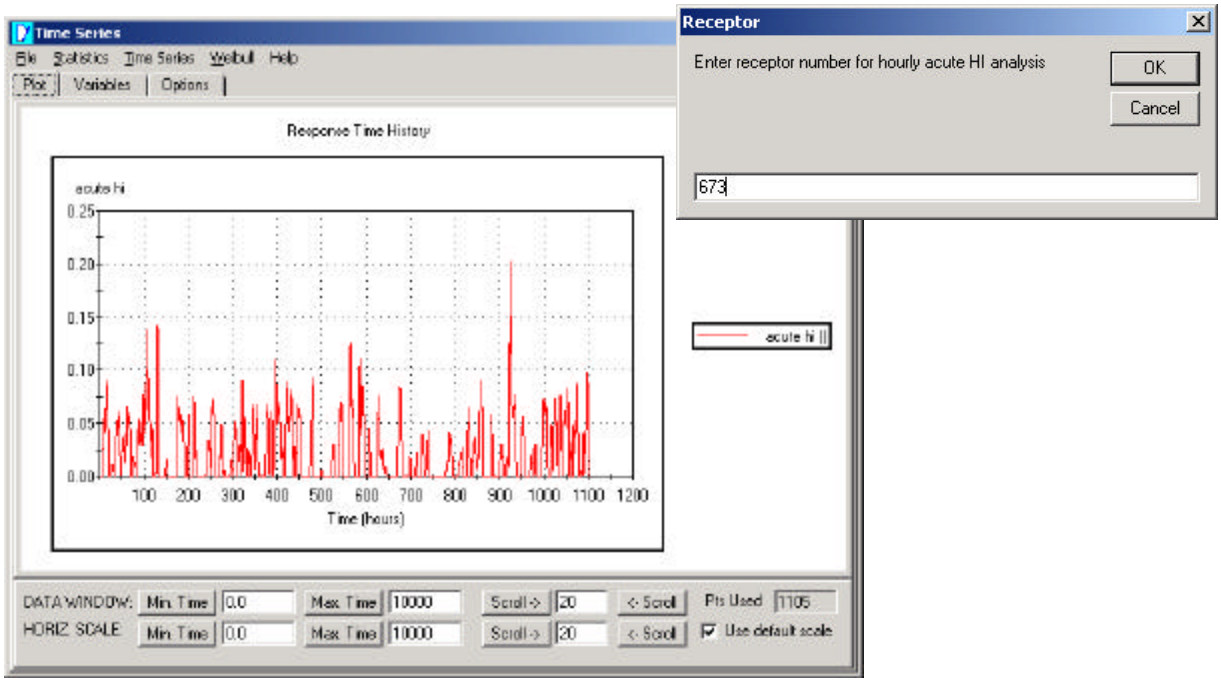
- ➢ From the *Risk* window, select ***Analysis/Population Exposure/Cancer Population Exposure Estimate and Cancer Burden***
- o The ***Cancer Threshold*** window will appear as shown below. The report will include all census receptors whose cancer risk exceeds the threshold value that you enter.
- ➢ Enter a value of 1.E-7, and press ***OK***.
- o The report will be written to the file *Cancer_Population_Exposure.txt*, which is located in the project directory.
- o The report will be displayed in the preview window. You can print it directly from this window. Because the report is a plain ASCII file you can also import it into any word processor or text editor.
- ➢ Identify how many people are within the 1.E-6 cancer risk isopleth. To do this, look down the column labeled Cancer Risk till you find the value closest to 1.E-6, then read the value under the Cumulative Burden column.
- o **IMPORTANT: <u>Note that this report lists only census block receptors</u>**, since these are the ones at which the census data is known. Isopleths generated by contouring the grid receptors. Because of the limited spatial resolution as determined by the receptor spacing, census block receptors may not always fall on the correct side of the isopleth contour line as expected. This is merely a reflection of the uncertainty in the location of the contours when they are based on coarse grid spacing.



4.7.13 Refined Max Hourly Acute Risk

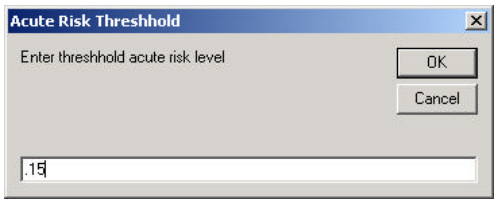
The refined maximum hourly acute risk is a true calculation of the risk, which relaxes the screening approximation described previously. This is a time consuming calculation. It calculates the acute health hazard index (HHI) at each hour of the simulation from all sources and allows you to determine the point in time that the maximum acute risk occurs, and the acute HHI at that time.

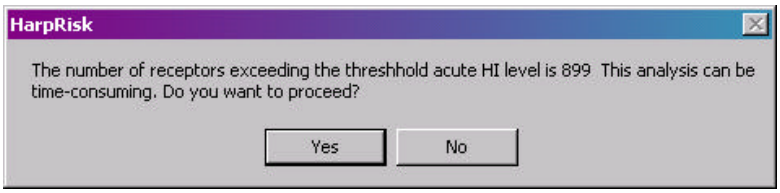
- ➢ Note from the PMI report the receptor with the highest screening acute risk.
- ➢ Sort the acute screening risk values under the *Risk* tab, and identify the location of the receptor with the highest acute risk.
- ➢ From the ***Risk*** window, select ***Analysis/Refined Max Hourly Acute HHI/Single Receptor***.
- ➢ You will be prompted for the receptor number as shown below. Enter the receptor number.
- o HARP will calculate acute HHI at each hour for that receptor and will display the results as a time series. This is illustrated below. This may take some time. Check the Log window for the progress of the calculation.
- o HARP uses the hourly X/Q values stored in the BIN file for this analysis.
- ➢ Note the value of the maximum acute HHI and the time that it occurs. The value of the acute HHI is always less than or equal to the screening acute risk.

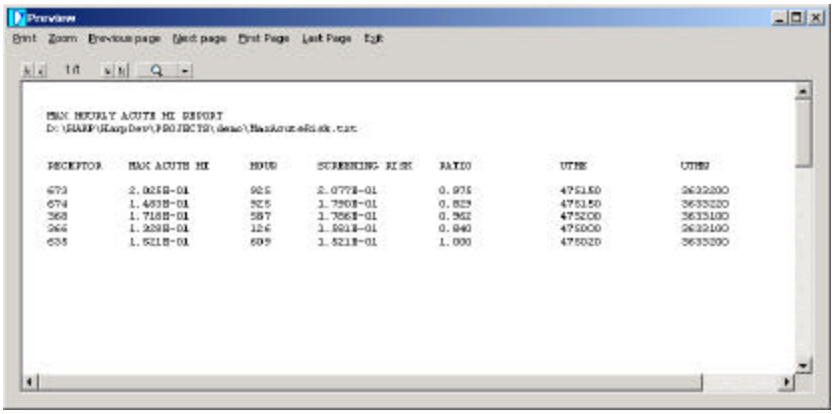


The following steps show how to create a report of maximum hourly acute risk for a set of receptors. The criterion for selecting the receptors is the acute screening risk.

- ➢ Note from the PMI report the receptor with the highest screening acute risk.
- ➢ Sort the acute screening risk values under the *Risk* tab, and identify the location of the receptor on the map.
- ➢ From the *Risk* window, select ***Analysis/Refined Max Hourly Acute HHI/All Receptors within an Isopleth***.
- ➢ You will be asked to enter the acute screening risk level. Enter 0.25.
- o You will be told how many receptors have an acute screening risk exceeding this level.
- ➢ Press ***Yes*** to continue with the report. Note that this can be a very time consuming calculation, especially if there are many receptors included in the report.
- o HARP calculates the maximum acute risk for each receptor that exceeds the specified screening risk level. As the analysis proceeds, intermediate steps in the report are displayed in the preview window.
- o To terminate the calculations before they are complete, press ***Stop*** on the menu bar of the main *Risk* window.
- o When the calculation is complete a preview of the Max Hourly Acute HI Report will be shown and a window with the time series plot will appear.
- o A sample report is shown below. Note that the maximum hourly acute risk is always less than the screening risk. This illustrates that the screening risk is always conservative. The RATIO shown on the report is the maximum hourly acute risk divided by the screening risk. The lines in the report are sorted in descending order of screening acute risk.





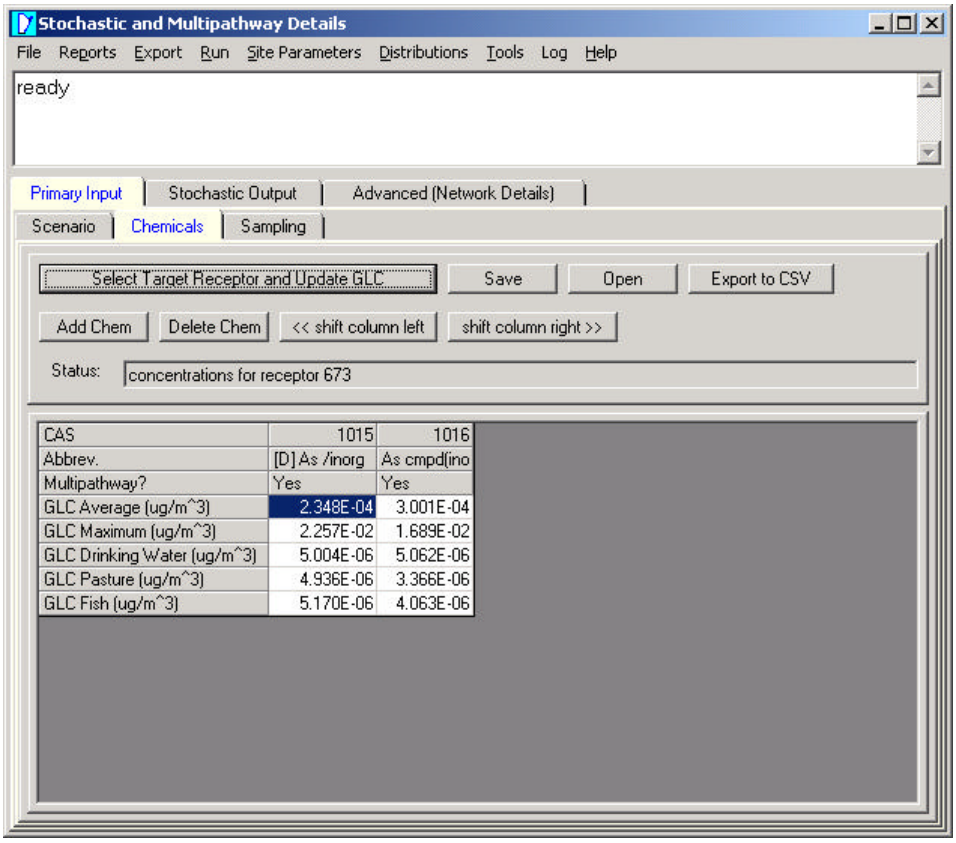


4.8 Track 8 – Stochastic Risk Analysis

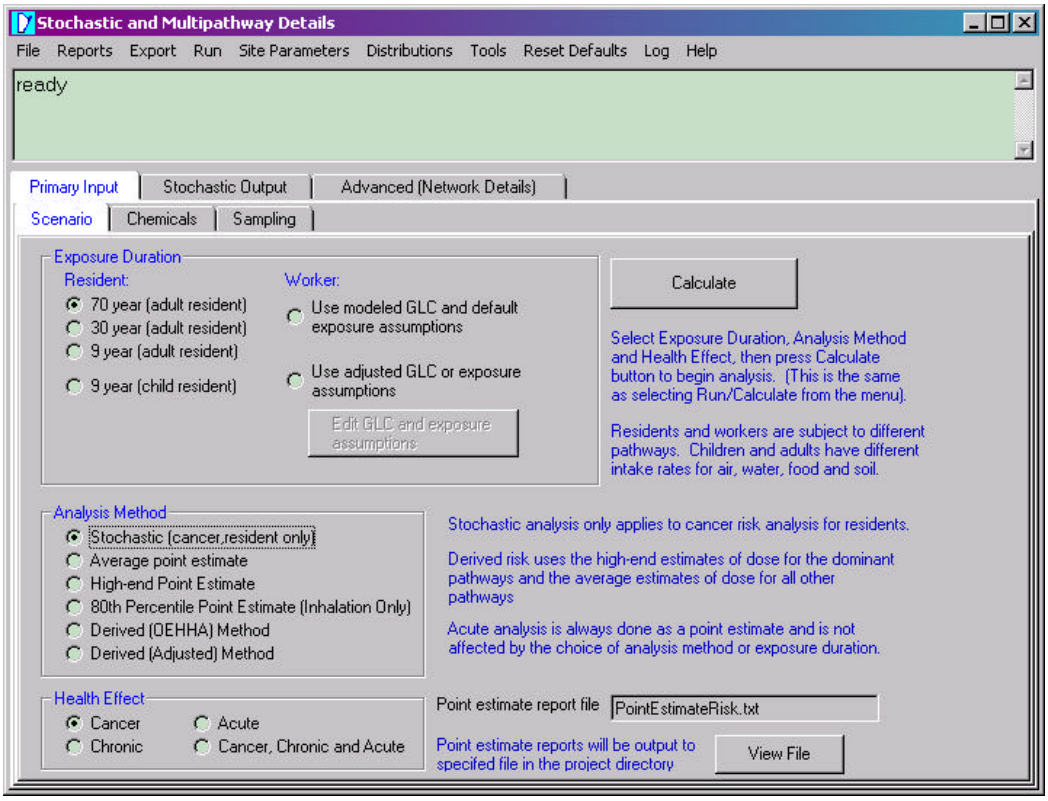
The stochastic analysis takes into account the variability of certain input parameters (for example breathing rate and food ingestion rates) among the human population. Stochastic analysis is accomplished by Monte Carlo simulation. HARP does this by randomly sampling the data distributions to obtain input parameters that are used in each trial or analysis. The point-estimate analysis uses a single value rather than a distribution of values in the dose equation for each exposure pathway.

4.8.1 Setting up and Running a Simulation

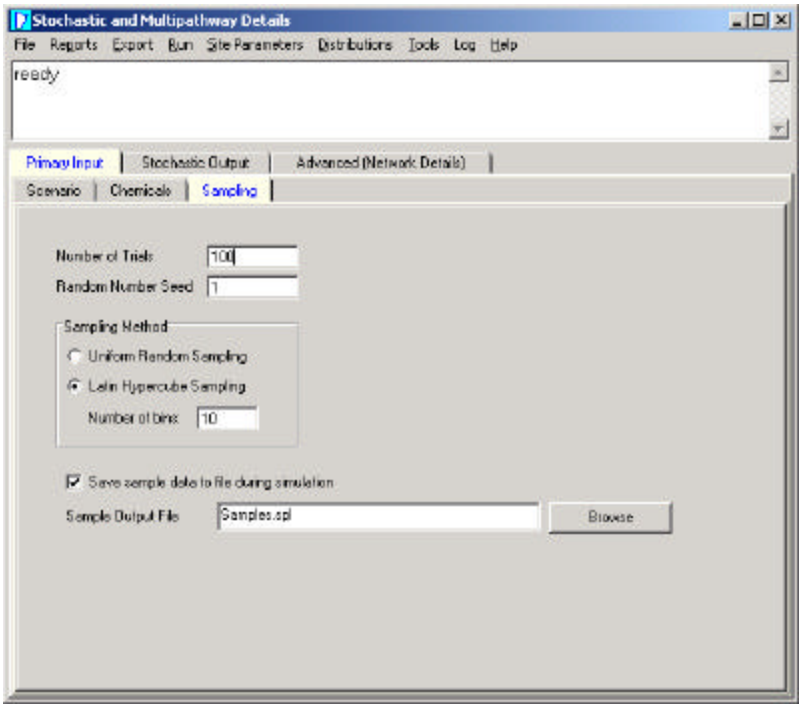
- From the *Risk* window, select ***Analysis/Stochastic (Includes Multipathway)***
- Select the ***Primary Input*** tab to edit primary input parameters.
- Select the ***Chemicals*** sub-tab to edit chemical concentrations.
- Click the button labeled ***Select Target Receptor and Update GLC*** and enter a receptor number.
  - The stochastic analysis is for 1 receptor only. So, you must tell HARP which receptor you are interested in (e.g., the PMI).
  - HARP will set the chemical names and ground level concentrations to match the values calculated on the *Risk* window for whichever receptor you choose. The window should appear as shown below.
  - At this point you may edit the GLC values that are shown. Click on a cell, then either type a new value or press the F2 Key on the keyboard to enter editing mode for that cell. Press ESC to cancel editing prior to pressing ENTER.
  - You may add a new chemical to the list by pressing the *Add* ***Chem*** button. This does not affect any of the numbers on the *Risk* window or in the HARP database.
  - You may delete a chemical from the list by pressing the ***Delete*** button.
  - The order of the columns may be changed by clicking on a column and pressing the << or >> buttons. This is only useful if you intend to inspect the detailed results on the ***Advanced*** tab. The details shown under the ***Advanced*** tab always correspond to the last chemical in the list shown on the *Chemicals* tab. See section 10.7.2.2 for more information.
  - Changes that you make under the *Chemicals* tab can be saved to a file and later retrieved by using the ***Save*** and ***Open*** buttons.
  - The list shown can be exported to a comma-delimited file by pressing the ***Export to CSV*** button.



- Select the ***Scenario*** sub-tab
- Set the exposure duration, analysis method and health effect
  - As the window below indicates, you have the option of performing point estimate risk analysis at this point also. This is largely redundant with the results that you created by the point estimate analysis in the previous section. Selecting a non-stochastic analysis method here will produce essentially the same report as before but for only one receptor.
- Select the ***Site Parameters*** from the menu and verify that the site parameters are correctly set for your site.

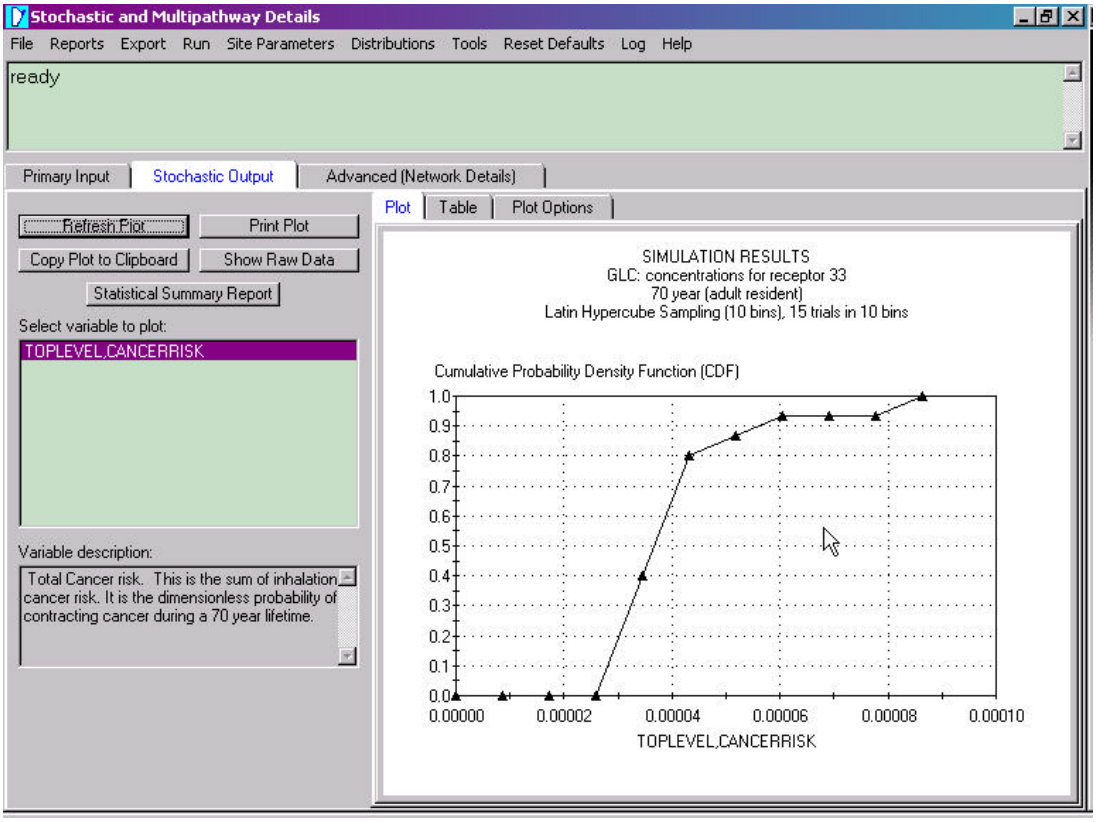


- ➢ Select the ***Sampling*** sub-tab.
- ➢ Set the sampling parameters as shown below.
- o This is a very short run to reduce the time for demonstration purposes. A more typical duration might be 1000 to 3000 trials.
- o The random seed number can be changed from one run to the next to ensure different results. For long runs the random seed number should not affect the statistical characteristics of the results
- o Latin Hypercube sampling causes the distribution of random samples to be more uniform. This improves the modeling accuracy of the tails of the distributions.
- ➢ Select ***Run/Calculate*** or press the ***Calculate*** button under the ***Scenario*** tab. This starts the simulation
- o You will be informed when the simulation is completed.

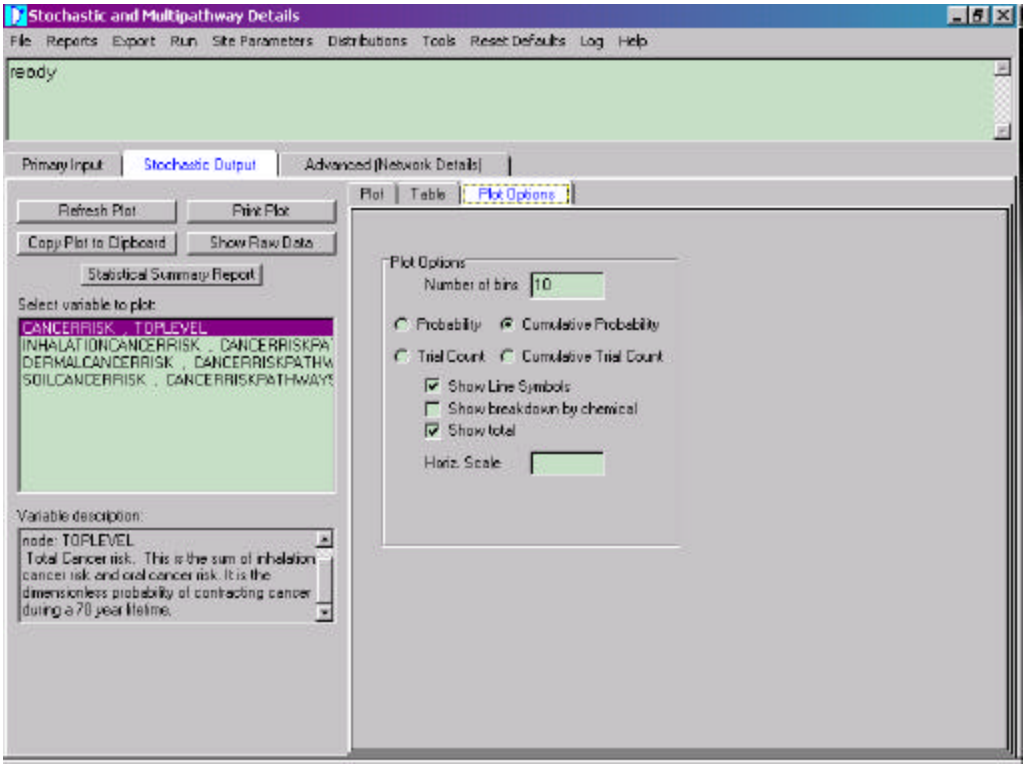


4.8.2 Viewing the Results

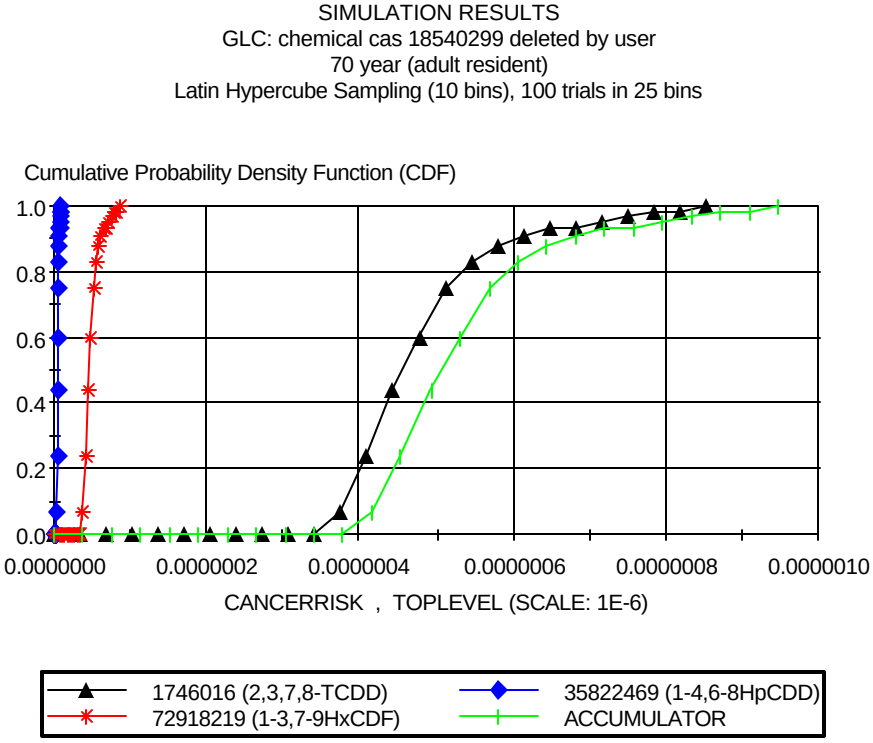
- Select the ***Stochastic Output*** tab.
- Press the ***Refresh Plot*** button
  - The window should appear as shown below. The graph on the right is the cumulative probability distribution of cancer risk.
- Use the ***Print Plot*** button to print the plot to the printer if you have a printer attached.



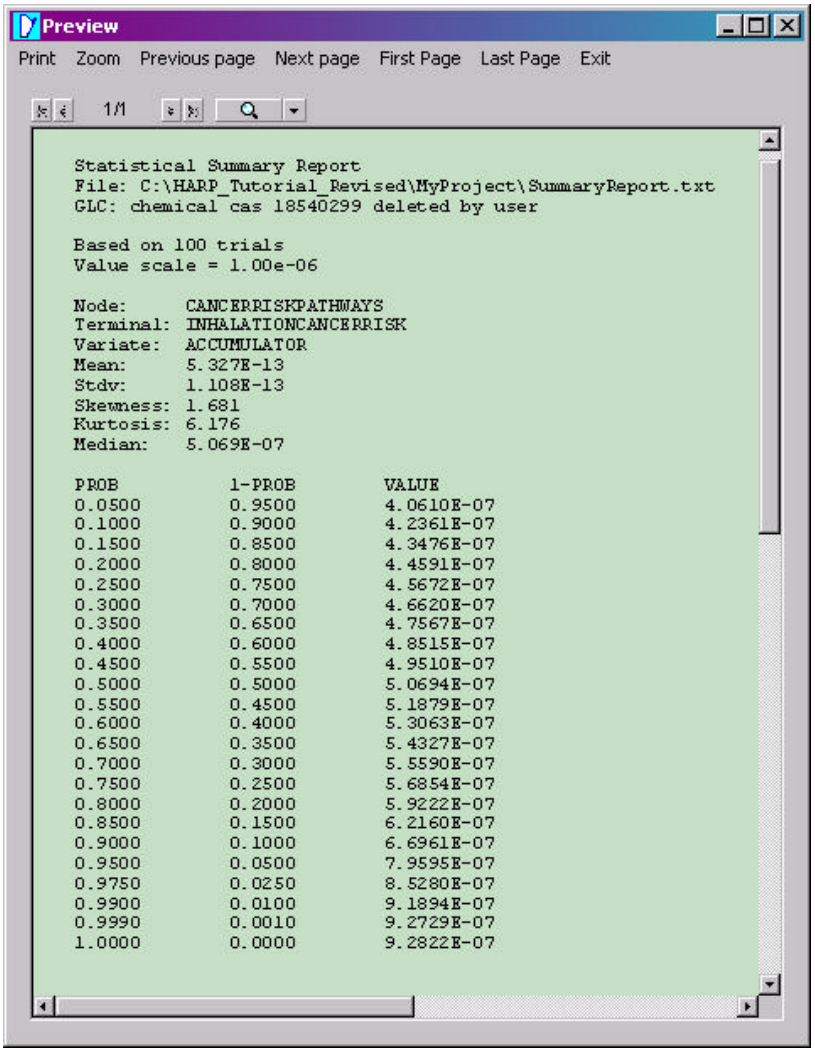
- Select the ***Plot Options*** sub-tab.
- Try each of the four plot types: Probability, Cumulative Probability, Trial Count and Cumulative Trial Count. After each of these is selected, press the ***Refresh Plot*** button.
- In the box next to ***Horiz. Scale***, enter 1.E-6. This scales all values on the horizontal axis by dividing them by 1,000,000 before plotting. Press *Refresh Plot.* This scaling factor is typically appropriate for plotting cancer risk. Since the values on the horizontal axis will then be on the order of 1 and are easier to read.
- Set the plot options to ***Cumulative Probability***
- Set the number of bins to 25.
  - The raw sample data is sorted into this number of bins, which therefore determines the number of points on the plot. Fewer bins mean a smoother plot with less detail.
- The plot options should look as shown below.



- ➢ Press the ***Refresh Plot*** button
- ➢ Click the ***Copy to Clipboard*** button.
- ➢ Open Word and paste the plot into a document.
- o The plot should appear as shown below
- o When you select ***Breakdown by Chemical*** the plot shows the statistical risk distribution for each of the chemicals individually, as well as the cumulative risk
- o The cumulative risk from all chemicals is labeled in the plot as ACCUMULATOR.
- o The values on the ACCUMULATOR curve are not the sum of the values on the individual chemical curves. This is because the samples for the individual chemicals are uncorrelated, and the raw sample data for each chemical is sorted separately to produce this curve. The chemical breakdown curves nevertheless provide a rough indicator of the relative contribution to risk from each chemical at each probability level. The individual chemical curves provide a correct estimate of what the risk would be if each chemical were taken by itself (i.e. the concentrations of the other chemicals were set to zero.)



- Uncheck the ***Show Breakdown by Chemical*** check box.
- Click the button labeled ***Statistical Summary Report***
- You will be prompted for a report file name. The report will be written to this file in the project directory. The report is an ASCII file that can be imported into a word processor.
- The preview window will show the report.
- The report should look as shown below.
- This report indicates, for example, that 99 percent of the population will be expected to have a cancer risk less than 9.1894 E-13 chances in a million. The 50^{th} percentile cancer risk is 5.069 E-13 chances in a million. The average cancer risk is 5.327 E-13 chances per million.



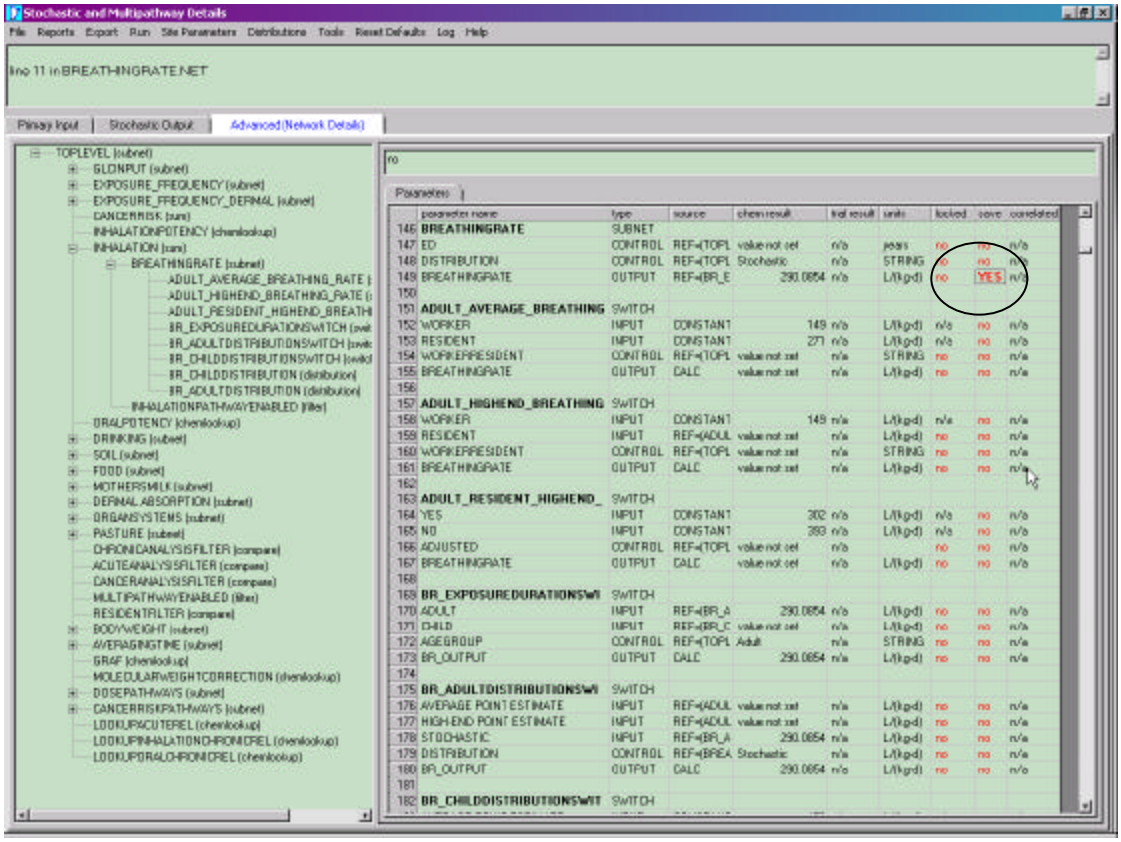
4.8.3 Stopping and Continuing a Simulation

- Select the ***Primary Input*** tab and then the ***Sampling*** tab.
- Set the number of trials to 200
- Select ***Run/Continue Stochastic***.
  - The simulation now continues from where it left off. If it is not interrupted, it will continue until a total of 200 trials have been executed.
- While the simulation is running, select either the ***Cancel Operation*** button on the log window or the *Stop* from the main stochastic window. The simulation will be halted immediately.
- Select ***Stochastic Output*** tab.
- Click the ***Refresh Plot*** button
  - The caption of the plot shows how many samples have been completed.

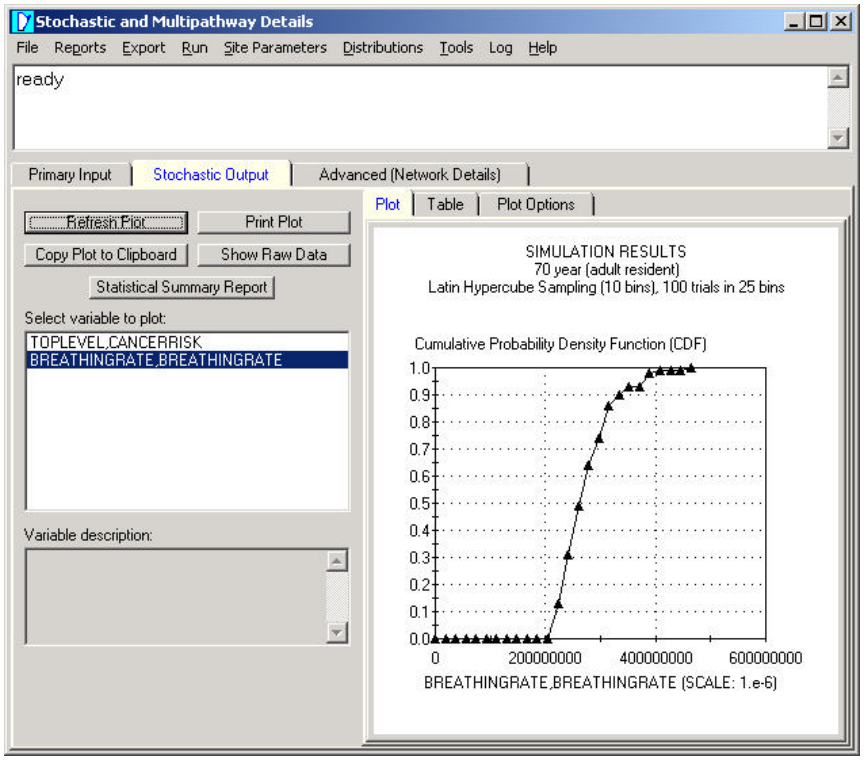
4.8.4 Selecting which Variates to Sample

In the above example only one random variable, namely cancer risk, was saved during the simulation. This is obviously the one of most common interest. However, there are many other variables that comprise the set of equations known as the "multipathway network". Sample data can be saved for any of these variables. This section shows how to capture and view the results of the simulation for breathing rate.

- ➢ Select the ***Advanced (Network Details)*** tab.
- ➢ On the left side of the window, expand the TOPLEVEL node. Then expand the INHALATION and BREATHINGRATE nodes.
- ➢ Click on the BREATHINGRATE node.
- o On the right side of the window, the details of the BREATHINGRATE node should now be visible.
- ➢ On line 149 (BREATHINGRATE parameter) of the right side of the window, scroll to the right to the ***Save*** column, and change the no to YES.
- o This indicates that you want the simulation data for the BREATHINGRATE variable to be saved for plotting.



- Select the ***Primary Input*** tab and then the ***Sampling*** tab.
- Set the number of trials to 100.
- Rerun the simulation by selecting ***Run/Calculate.***
- Select the ***Stochastic Output*** tab
  - Note that there are now two variables displayed in the selection list on the left side of the window.
- On the left side of the window, in the list labeled ***Select variable to plot***, select BREATHINGRATE.
- Click the ***Refresh Plot*** button.
  - The cumulative distribution of breathing rate should now appear as shown below.



4.8.5 Overriding and Locking Parameters

- Return to line 149 (BREATHINGRATE parameter) of the network details window, as in the previous section.
- Under the column labeled ***Chem Result*** set the value of BREATHINGRATE to 200.

- The ***Chem Result*** column shows the value of each variable as it was calculated for the most recent chemical that was processed through the simulation. Some of these variables are constants, some are random, and some are set externally to correspond to the site parameters.

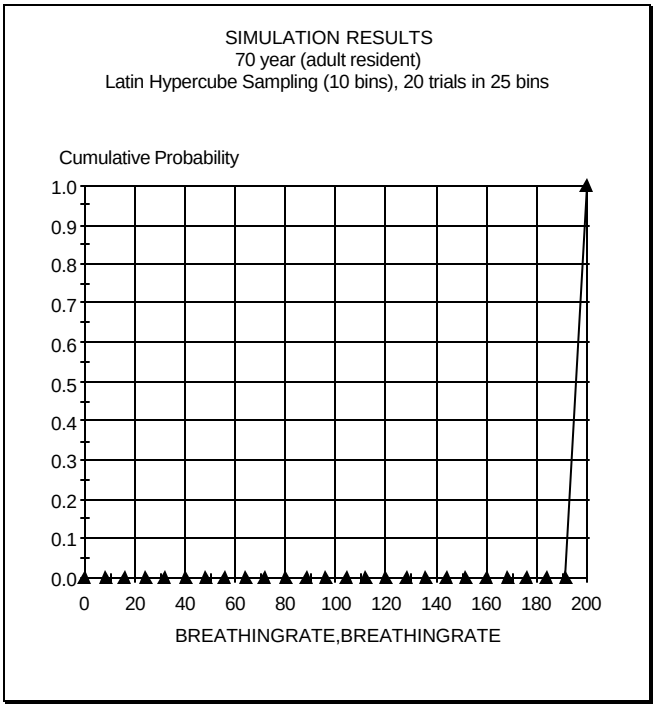
➢ Scroll to the right, and in the column labeled 'locked' change the no to YES.

- This indicates that the BREATHINGRATE variable is to remain locked during the simulation. Its value will not be determined by random sampling, but will retain the value that you input, which is 200.

➢ Run a short simulation.

➢ Select the ***Stochastic Output*** tab; select BREATHINGRATE as the variable to plot; then click ***Refresh Plot***.

- The distribution of breathing rate should now look as shown in the plot below. This plot indicates that there is a 100% probability that the BREATHINGRATE will have a value of 200, which is consistent with the fact that the value has been constrained to this value by locking it.



4.8.6 Generating an Exception Report

The values of all constants on the ***Advanced (Network Details)*** window (i.e. the network details) have been preset to conform to the OEHHA Guidelines. As was shown in the previous section, it is possible to alter those values, and also to lock variables that would otherwise vary randomly. In order to provide documentation on the changes that you may have made to the network details, HARP will automatically generate an exception report when you press ***Calculate***.

- ➢ To manually generate an exception report, select ***Report/Exception Report*** from the menu of the ***Stochastic*** window.
- o You will be prompted for the name of the file that you want to write the report to, which is normally located in the project directory.
- o After the report is written, it will be displayed in the ***Preview*** window.
- o The report is an ASCII file that can be imported into a word processor
- o The exception report that reflects the changes made in the previous tutorial section is shown below.
- o In the report below, line 161 refers to the line on the network details window under the ***Advanced (Network Details)*** tab. This should aid you in locating the variable.
- o OLDVALUE is zero because the breathing rate does not have a value initially. Its value is set during the simulation to correspond to the scenario that you have selected (i.e. exposure duration and analysis method). Other parameters will be initialized with values. For example, see resident adult high-end breathing rate on line 165 of the network. The value393 is specified in the OEHHA Guidelines.
- o NEWVALUE indicates the new value that you have set.
- o STATUS CHANGES indicate when you have changed either ***locked*** parameter. In this case BREATHINGRATE has been locked.
- o The ***Chem Result*** column shows the value of each variable as it was calculated for the most recent chemical that was processed through the simulation. Some of these variables are constants, some are random, and some are set externally to correspond to the site parameters.
- ➢ Select ***Tools/Reset Network Defaults.***
- o This resets all parameters on the network to their default values as recommended by OEHHA.
- ➢ Create the exception report again. Note that there are now no exceptions.

EXCEPTION REPORT
File: C:\HARP\PROJECTS\DEMO\ExceptionReport.txt

The following non-default changes have been made to the network:

LINE	NODE	TERMINAL	OLDVALUE	NEWVALUE	STATUS CHANGES	UNITS
0161	ADULT_HIGHEND_BREATHING_RATE	BREATHINGRATE	0.000E+00	3.020E+02	LOCKED	L/(kg-d)

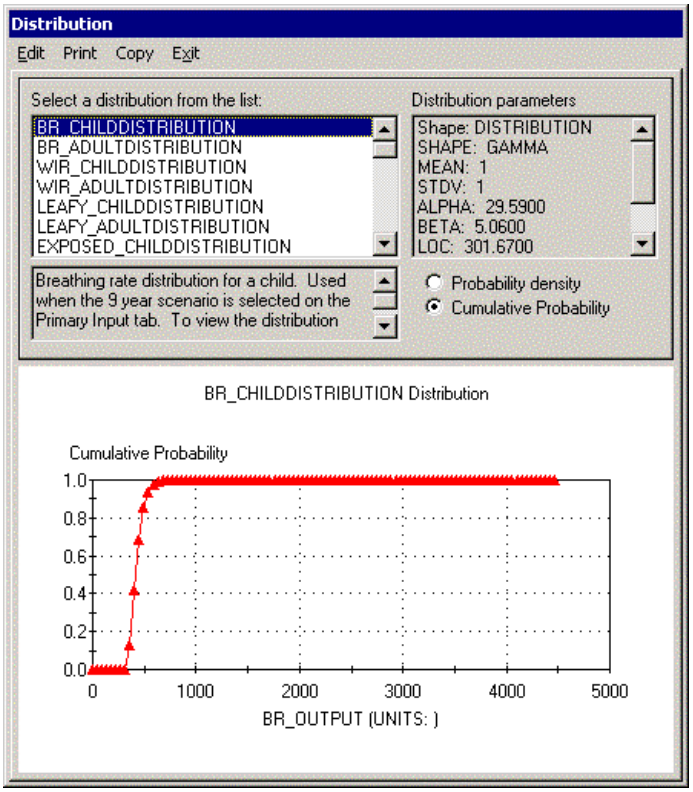
4.8.7 Resetting the Network

If you have made any changes to the Network Details under the ***Advanced (Network Details)*** tab and wish to restore the original values, click on ***Reset Defaults*** on the top of the *Stochastic and Multipathway Details* window.

4.8.8 Viewing Variate Distributions

The OEHHA Guidelines specify 37 random variates that are part of the system of equations that describe the multipathway network. The parameters for each of these distributions have been preset to the values recommended in the guidelines. This section describes how to view each of these distributions.

- From the ***Stochastic*** window, select ***Distributions***.
  - The ***Distributions*** window appears as shown below.
- Select the first variable in the list in the upper left corner of the window.
  - The plot shows the cumulative probability distribution for the breathing rate of a child.
  - This ***Distribution parameters*** pane shows the distribution parameters for the selected variable. In this case the child breathing rate distribution is a Gamma function with Alpha=29.59, Beta=5.06, and Loc=301.67.
  - Depending on the shape of the distribution, HARP will use the alpha, beta and loc parameters or the mean and stdv parameters. Because this is a gamma distribution, the mean and stdv are not used, so their values are irrelevant.
  - As you select different variables from the list on the left, the pane just below this list shows a brief description of what the variable means.
- Compare the child breathing rate distribution shown below to the simulation results in section 4.9.4.

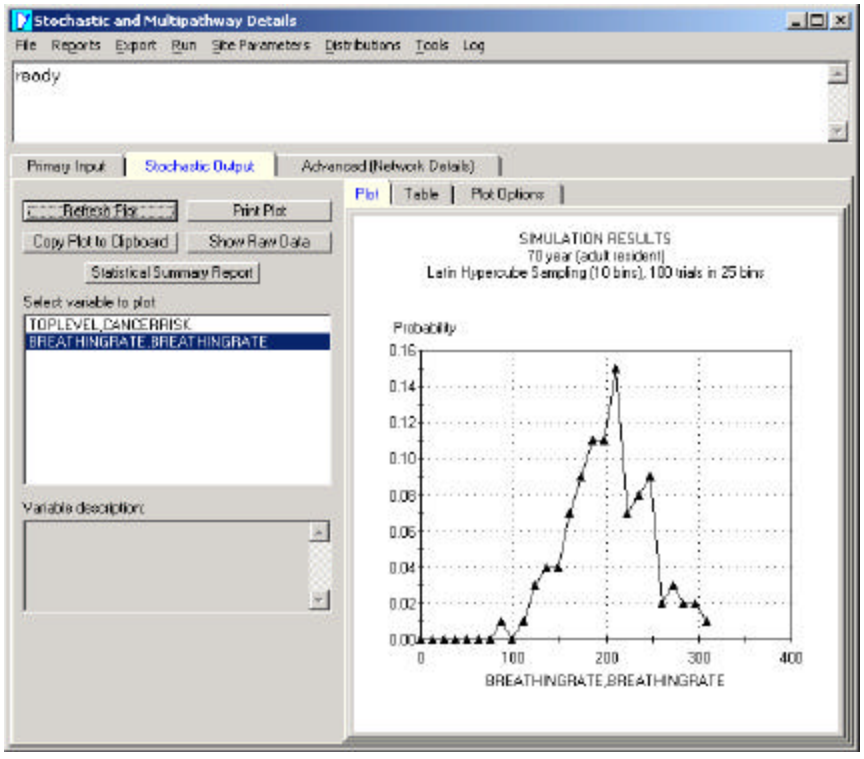


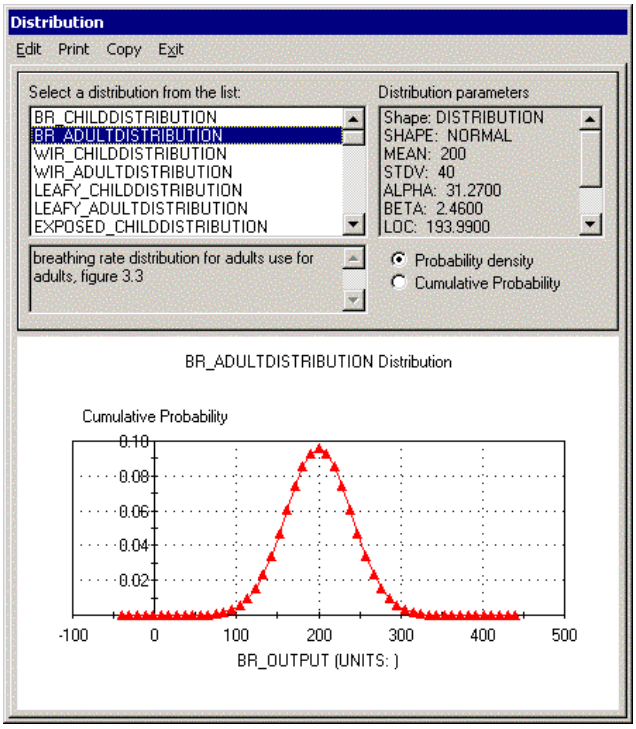
4.8.9 Editing Distribution Parameters

As with other aspects of the network, variable distribution parameters can be changed by you. This is not recommended, since it represents a deviation from the OEHHA recommendations. Nevertheless, this section illustrates how to change them.

- The adult breathing rate distribution will be changed to a normal function with a mean of 200 and a standard deviation of 40.
- ➢ Select the ***Advance*** tab of the ***Stochastic*** window.
- ➢ On the left side of the window, expand the TOPLEVEL node of the outline if it isn't already expanded. Expand the INHALATION node. Then expand the BREATHINGRATE node.
- ➢ Click on the BR_ADULTDISTRIBUTION node
- The adult breathing rate distribution parameters should now be shown on the right side of the window, starting with line 200.
- ➢ Place the cursor under the ***Chem result*** column, on line 201, which is the SHAPE parameter.
- ➢ Type the letter N.
- The distribution shape changes to NORMAL

- Note that the SHAPE parameter is described in the information pane at the top of the window. Refer to this pane for help when browsing through the network variables.
- ➢ Move the cursor to line 202 and change the value of MEAN to 200 in the *chem. result* column.
- ➢ Move the cursor to line 203 and change the value of STDV to 40 *chem. result* column
- ➢ Make sure the save parameter is still set to YES for BREATHINGRATE on line 149.
- ➢ Run a simulation using 100 trials.
- ➢ Plot the probability distribution function for breathing rate
- The results should appear as shown below
- ➢ Compare the results above to the new theoretical breathing rate distribution as shown below.
- Generate a new exception report, which should look like the one below.
- NOTE: If you have the exception report open while you are running a stochastic simulation, you will get a run-time error. This is because HARP can't write to the file while it is open.






```
EXCEPTION REPORT
File: C:\HARP\PROJECTS\DEMO\ExceptionReport.txt

The following non-default changes have been made to the network:


LINE  NODE                      TERMINAL          OLDVALUE       NEWVALUE         STATUS CHANGES    UNITS

0149  BREATHINGRATE              BREATHRATE       0.000E+00      2.000E+02         LOCKED          L/(kg-d)
0201  BR_ADULTDISTRIBUTION       SHAPE            GAMMA          NORMAL            nd
0202  BR_ADULTDISTRIBUTION       MEAN             1.000E+00      2.000E+02
0203  BR_ADULTDISTRIBUTION       STDV             1.000E+00      4.000E+01
```

4.8.10 Exporting Data

There are two types of data that can be exported from the stochastic analysis, the raw sample data and the plot data. The plot data corresponds to the X-Y values that are shown on the current plot that you have created. The raw sample data contain the results from every trial.

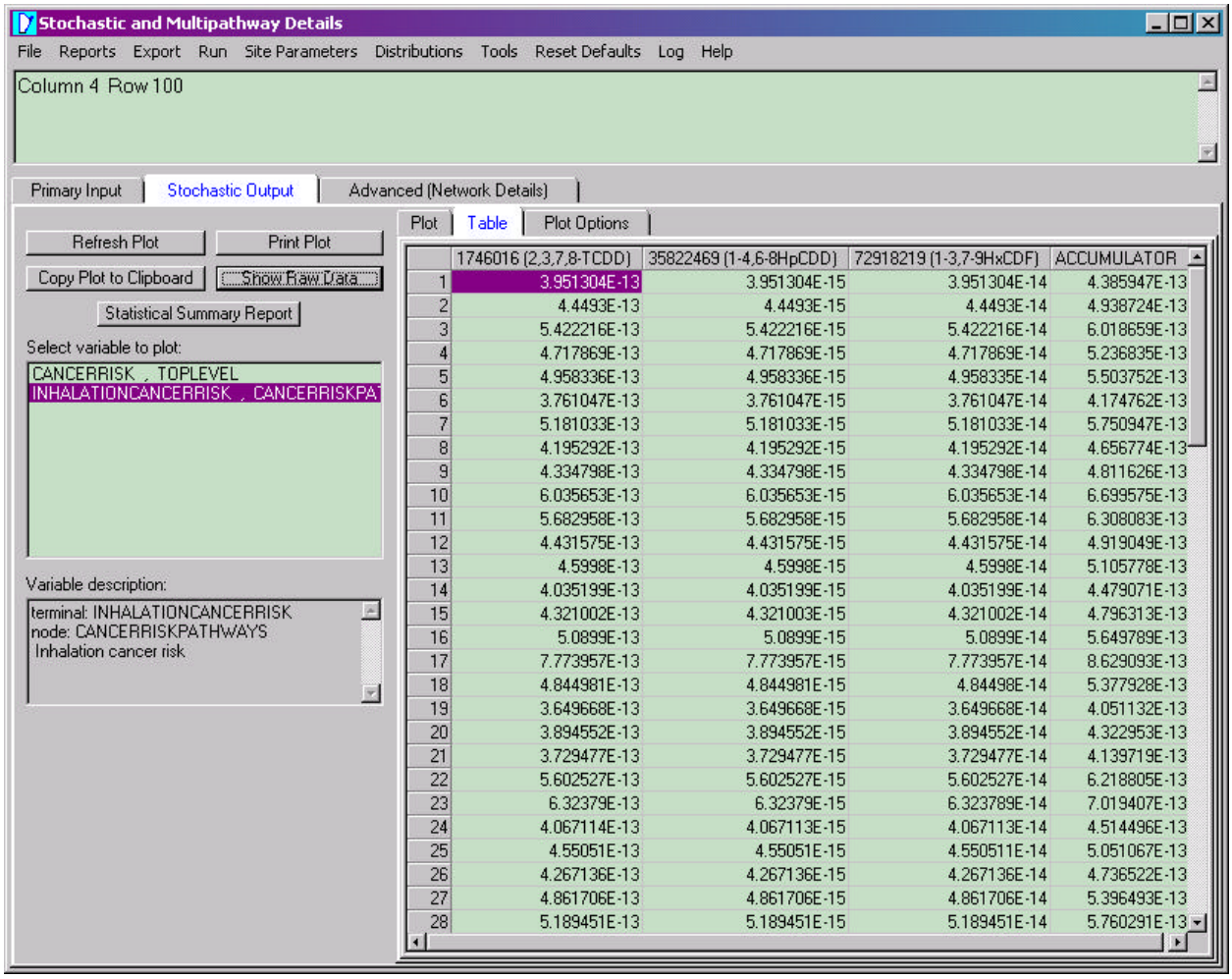
4.8.10.1 Exporting Plot Data

- Run a simulation of, say, 200 trials
- Create a plot of cancer risk, choosing 20 bins for data sorting.
- Select ***Export/Distribution Data***
  - You will be prompted for a file name. The data will be written in comma-delimited (CSV) format.
  - After the file is written, the preview window will show the contents of the file.

- ➢ Use the Window Explorer to locate the file that you have just created. Double-click on the file name. This should cause Excel to load and then immediately read the file. (CSV files are normally associated with Excel)
- ➢ Make a scatter plot of the data using Excel. The plot should match the one shown on the ***Stochastic*** window.
- ➢ Select the ***Stochastic Output*** tab. On the right side of the window, select the ***Table*** tab.
- o The table that is displayed shows the plot data as a series of x-y pairs. This is the same data that is currently plotted. It is also identical to the data that you just exported.

4.8.10.2 Exporting Raw Sample Data

- ➢ Under the ***Stochastic Output*** tab, Click the button labeled ***Show Raw Data***
- o The window should appear similar to the one below.
- o Under the ***Table*** tab you can now see the raw sample data. Each column corresponds to one of the chemicals or the total cumulative result. In this case the result shown is cancer risk.
- o Each line of the table corresponds to one trial.
- o The values correspond to the results for each trial.
- ➢ Scroll down the list to verify that the number of rows in the table is the same as the number of trials that you ran.
- ➢ Select ***Export/Raw Sample Data.***
- ➢ When prompted, select an output file to write the data to.
- o The exported data is in ASCII, comma-delimited (CSV) format suitable for importing into various external programs, including Excel.



4.8.11 Health Table

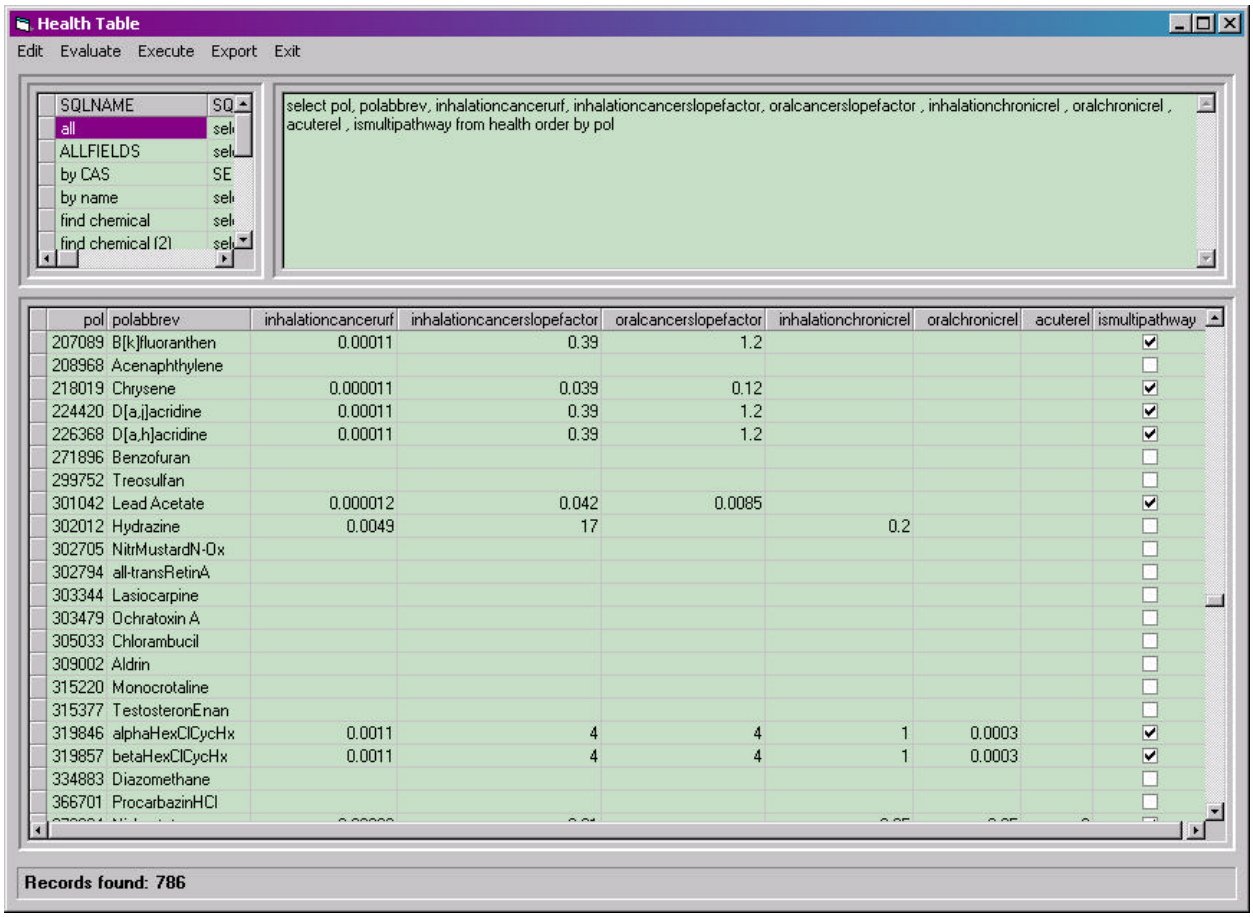
The Health table is stored in the file HEALTH.MDB, which is located in the HARP program directory. It contains all of the chemical-specific parameters defined in the OEHHA Guidelines. Besides numerical values, it also contains Boolean variables that specify, for example, which chemicals are multipathway, which pathways are enabled for each chemical, which toxicological end points each chemical affects, and so forth.

To see a list of all of the chemicals in the HEALTH table, select ***Tools/Health Table*** from the menu of the Stochastic Window, or select ***Health Table*** from the Risk window menu. The *Health Table* window will appear as shown below. To use this window to examine the contents of the health table, you must be familiar with SQL.

Click on one of the SQL statements in the upper left pane to select it, and then select ***Evaluate*** to evaluate the SQL query. The result will appear in the lower pane and the SQL statement itself will appear in the upper right pane.

To add a new query, select ***Edit/New Query***. Then enter a query name. Then type the SQL statement in the upper right pane. Your new query is now permanently saved in the database and can be evaluated by clicking on it and then selecting ***Evaluate***. For additional information, see section 5.21 on "general query" in the emissions chapter under Utilities.

Fourteen sample queries are provided as a starting point.



Chapter 5 Table of Contents

5. Database Management

5.1 HARP Database Management Background

The Hotspots Analysis and Reporting Program (HARP) database is designed to hold three types of data: point sources (facilities), areawide (regional) sources, and sensitive receptors. Point sources are discrete sources and are uniquely identified by IDs – FACIDs. Within a discrete point source, an emission release can either be point, volume, area, or open pit. Areawide sources are always considered to be district-wide sources, such as paved and unpaved road dust, and consumer products, which are not associated with a specific facility. Sensitive receptors are identifiable subsets of the general population that are at greater risk than the general population to the toxic effects of a specific air pollutant (e.g., infants, asthmatics, elderly).

The database is also divided into reporting years storing discrete information for each reporting year including stationary point, area, mobile, and natural sources. The data within the database is saved in tables. These tables match the tables in the Air Resources Board's (ARB) CEIDARS (California Emissions Inventory Data Analysis and Reporting System) database.

See Appendix A for a set of simple "how to" guides that are intended to assist users with some basic HARP applications and chapter 4 for an example tutorial.

5.2 What is CEIDARS?

CEIDARS (California Emissions Inventory Data Analysis and Reporting System) is a database management system developed by ARB to track statewide pollutant emissions. The current implementation, known as CEIDARS 2.5, combines both toxics and criteria pollutants into a single database, and is a major upgrade to the previous CEIDARS system. In addition to the emissions inventory, CEIDARS is designed to store facility risk data and other mandated information such as the facility status and area of designations.

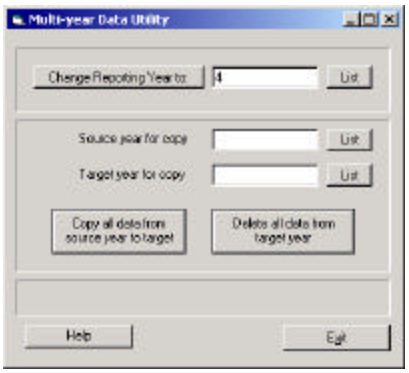
5.2.1 What is CEIDARS-Lite?

The emission inventory component of HARP is a database (known as CEIDARS-Lite) that is nearly identical in structure to the CEIDARS 2.5 database. The CEIDARS-Lite database is utilized by HARP to facilitate transmission of data from the air districts to the ARB CEIDARS 2.5 database. It will also promote consistency in gathering and reporting of emissions data by the districts. HARP provides functions for entering and editing facility emissions data, generating reports, and exporting or importing data in a transaction file format that is compatible with CEIDARS 2.5.

CEIDARS-Lite is one component of HARP. HARP also provides functions for dispersion and health risk analysis, which are fully integrated with CEIDARS-Lite. This allows users to carry out a complete health risk analysis following the Office of Environmental Health Hazard Assessment (OEHHA) guidelines for any facility in the database with minimal reentry of data.

5.3 Multi-year

HARP can keep track of multiple reporting years within the same database. For the purpose of data editing and reporting, each year is completely independent, just as if it were contained in a separate database altogether. The multi-year utility functions of HARP make it possible to manipulate data from different years. To access these functions, select ***Utilities/Multi-year*** from the main menu. This will cause the following dialog window to be displayed.



To change the current reporting year, enter a year in the text box at the top of the window and press the button labeled ***Change Report Year to***. Henceforth, all data editing and reporting functions will utilize data from that year. HARP will remember the current reporting year even if you exit HARP and reboot the computer. The current reporting year will remain the same until you repeat the steps described here to change it.

If you cannot remember what reporting years are stored in the database, you can press the top button labeled ***List*** next to the reporting year box to select one of the years stored in the database.

You can copy all data from one reporting year to another by entering the year you want to copy data from in the box labeled ***Source year for copy***, and entering the year you want to copy data to in the box labeled ***Target year for copy***. Then press the button labeled ***Copy all data from source year to target year***. This provides a convenient way to start a new reporting year and initialize it with data from a previous year. Any differences between the two years can then be reported using the ***Compare Two Years*** report (select ***Reports/Compare Two Years*** from the main HARP window).

When changing to a new reporting year, you do not necessarily have to specify a year for which you currently have data. If there is no data for the year you specify, it is equivalent to creating an empty database for that year. This can be a convenient way to create a "scratch" area to enter real or fictitious data for test purposes. Simply specify a nonsensical reporting year such as 1001. Reporting years can range between –32,767 and +32,767. However, any year with a negative number may be overwritten when the program is updated. You can then edit data for that year, copy data to that year from some other year, or import data from transaction files into that year without worrying about corrupting your actual permanent data. When you want to remove one of these scratch years from the database, enter the year in box labeled ***Target year***

for copy and then press the button labeled ***Delete all data from target year***. (It would be wise to occasionally backup your entire database, which is contained in the file HARP.MDB.

5.4 Point and Areawide Sources

Stationary point sources are discrete sources that can be identified by locations and are often permitted by local air districts. These sources consist of facilities, stacks (emissions releases), devices, processes, and pollutant emissions. Within each stationary point source, there can either be an ISC point emission release, a volume source, an area source such as a pond, or an open pit.

Areawide (Regional) sources are inventoried at a county level and are not identified as discrete sources and can either be stationary aggregated point or areawide sources. Examples of stationary aggregated point sources are internal combustion (IC) engines such as pumps from farms, and degreasers from auto repair shops. These sources are stationary yet are small enough in emissions and therefore are not included in the districts' point source inventory. Other sources such as paved and unpaved roads, and consumer products are classified as areawide sources. These sources are uniquely similar and are grouped together for inventory purposes. CEIDARS-Lite is expanded to include areawide sources as emission inventory database tools. Users can either enter and/or edit point or areawide sources using CEIDARS-Lite. However, HARP does not use areawide sources for dispersion or risk analysis due to the nature of these sources.

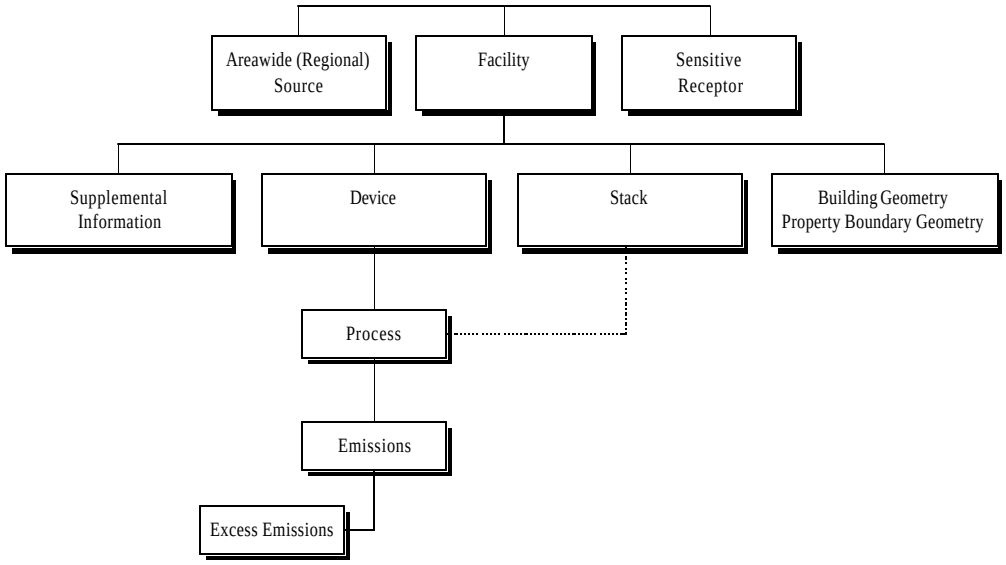
When you select ***Edit Data/Facilities and Emissions*** you are always editing discrete (point) source data associated with a single facility. If you want to edit areawide source data you must select ***Edit Data/Area wide (Regional) Sources*** from the main menu. When you do this, HARP will take you directly to the process data window. Internally, all process and emissions records for areawide sources are associated with a specific COABDIS (County, Air Basin, District), a fictitious facility, whose ID is 0, and a fictitious device, whose ID is also 0.

For discrete (point) sources, the process ID must be an integer number from 1 to 99. For areawide sources the process ID must be an EIC code from the EIC table. Areawide sources are assigned by the ARB and therefore can only be edited but not added. If the districts need to create an areawide source category, contact the Emission Inventory Branch of the ARB for assistance. For more information on areawide sources see section 5.15.

5.5 Organization of the Point Source

In order to better understand the organization of HARP, it helps to understand the hierarchical organization of the underlying database. This is illustrated in the following diagram.

HARP (CEIDARS-Lite) Database Organization



Most data is associated with facilities. Therefore the most common starting point for entering data is the facility database. To enter the facility database, select ***Edit Data/Facilities and Emissions*** from the main menu. Submenus provide access to data related to devices, processes and emissions. In order to enforce the hierarchical structure of the database, you must specify a facility before editing device data, and you must specify a device before editing process data, and so on. Everything from the facility-editing window on down to emissions is essentially a replication of the CEIDARS 2.5 database.

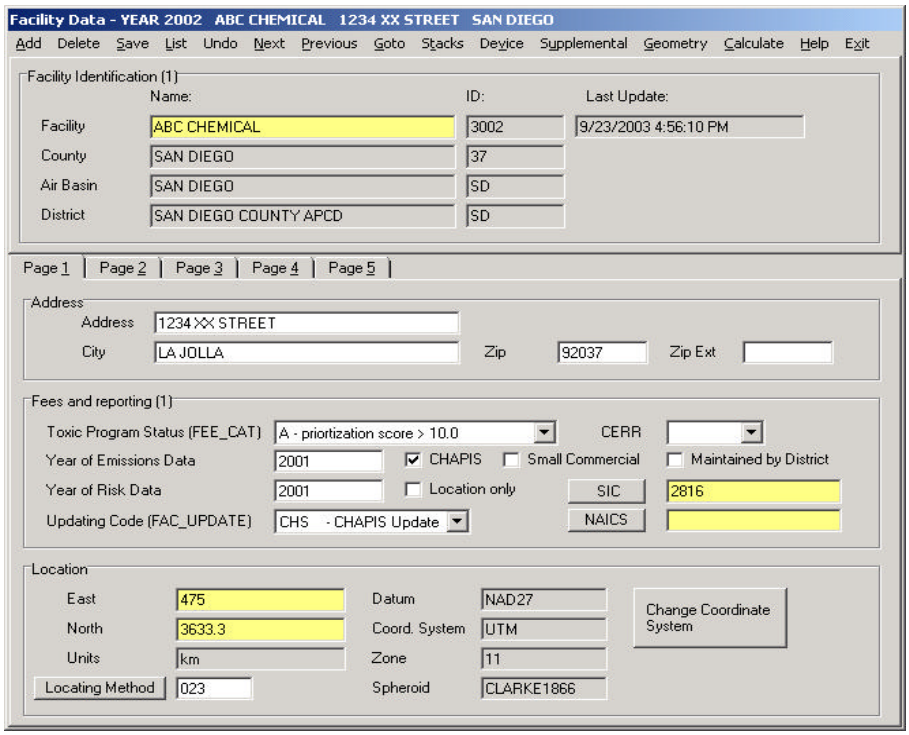
Data which is not represented in the CEIDARS 2.5 database, but which is nevertheless required for risk assessment, is also accessed through submenus of the ***Edit Data*** menu option. These include sensitive receptors, building geometries and property boundaries. The building geometry data is necessary for the downwash calculations related to dispersion analysis, and the property boundaries data is necessary for prioritization and risk analysis.

Appendix C includes the CEIDARS 2.5 data dictionary and Appendix D includes transaction format documents. Except for the reporting year that HARP uses as a key field, the CEIDARS data dictionary is essentially the same as in the HARP database.

5.6 Facility Data Window

The facility data window is used to edit data contained in the facility table. To edit facility data select ***Edit Data/Facilities and Emissions*** from the main window. The HARP database comes without actual facility and emissions data. The only data in the database is fictitious data for the tutorial. When you select a new reporting year and do not copy any data into that year, HARP will display a warning message and the facility window will be blank. You must add a facility to the database before you can enter any device, process, emissions, stack, or supplemental data. To add a facility, refer to section 5.9.

The facility data window appears as shown below. The fields highlighted in yellow are the minimum input required to perform dispersion and risk analysis. The other fields are required by ARB for emissions reporting.



The following sections describe the menu options and data fields.

5.7 Data Editing Guidelines

5.7.1 Shortcut Keys

HARP was designed so that most functions can be invoked without using the mouse. Any menu item or button whose name contains an underlined letter can be activated by holding down the Alt key and pressing the underlined letter. Certain menu items, such as the Delete function, do not have shortcut keys, so that they will not be inadvertently activated by mistyping.

When editing data the tab key can be used to move to the next field on the window. The Shift-Tab key combination can be used to move to the previous field.

5.7.2 Common Data Editing Menu Items

Some menu options, which are common to all data entry screens, are described in this section. These menu options apply to facility data, device data, process data, emissions data, supplemental data, stack data, and sensitive receptor data.

Add

The ***Add*** menu option is used to add a new record to the database. The type of record added depends on which data entry form is currently displayed. When adding a new record, you will immediately be prompted to provide values for any item that is part of the unique key for that record. Where appropriate, a button will be shown that can be used to select from a list of legal entries. Each record that is added must have a unique key, which is comprised of several of the fields. For example, the key for a new facility consists of facility ID, county, air basin and district. If the key field values that you provide are not unique, an error message will be displayed and the record will not be added. When adding a new record by selecting the ***Add*** menu option, all fields on the new record will be cleared.

Duplicate

The ***Duplicate*** menu option is similar to the Add menu option, except that the data fields are not cleared from the data entry window before adding the new record. This provides a way to copy all fields except the key fields from an existing record to another new record. The duplicate function only duplicates the record that is currently shown. In other words, duplicating a facility record does not cause HARP to duplicate the subordinate stack, device, process and emissions data.

Save

The Save menu option causes any changes which you have made to the field values on a data editing window to be immediately saved to the database. You cannot cancel your changes after the record has been saved. Before the record is saved, it is validated by HARP to make sure that values you provide are appropriate. If the validation fails, HARP will display a warning message telling you the invalid fields, and the record will not be saved. If you make a serious error and want to cancel your changes, you can do so by selecting the ***Undo*** menu option.

List

The List menu option will display a list of records from the table currently being edited. You may select from the list to display that record in the editing window.

Next

The ***Next*** menu item moves to the next record in the current table. If no more records are available then a warning message will be displayed and the last available record will be displayed.

Previous

The ***Previous*** menu item moves to the previous record in the current table. If the first record in the database is already displayed then a warning message will be displayed.

Goto/First

This menu option will move the data entry window to the first available record in the database.

Goto/Last

This menu option will move the data entry window to the last available record in the database.

5.7.3 Help Buttons

The data editing windows contains numerous buttons that you can use to get assistance in entering values in certain fields. Each button appears next to the data field to which it refers. The function of the button depends on the data field. In most cases the button calls up a list of acceptable values for that field. Each of the help buttons can be activated from the keyboard by using the shortcut key corresponding to the underlined letter on the button caption.

5.7.4 Tab Keys

The tab key can be used to move the cursor sequentially through all of the editable fields on a data entry window. The Shift-tab key combination moves the cursor sequentially in the backwards direction. The tab key can be used in combination with the Shortcut keys (refer to section 5.7.1) to perform data entry without using the mouse.

5.7.5 Validation

Data that you enter in one of the data editing windows is validated at the time the record is saved. Validation consists of checking each of the input data values against the allowable values or range of values. Validation occurs when one of the following events occurs:

1) You select the ***Save*** menu option. If the validation fails, HARP will display a message describing the nature of the failure, and the record will not be saved.

2) You select the ***Exit*** menu option after making changes. In this case HARP will first prompt you to determine whether you want to save the changes. If you answer no, no validation will be performed and your changes will be lost. If you answer yes, the validation of you input data will be done before the record is saved. If the validation fails, HARP will display a message describing the nature of the failure, the record will not be saved and the window will remain as it was. HARP will not exit a data-editing window until changes that you have made have been correctly validated and saved or you have selected ***Exit*** and responded that you do not wish to save your changes.

5.8 Facility Data Field Descriptions

The following is a description of the data fields on the facility editing windows.

Facility Name	The descriptive name of a facility. The name can be any alphanumeric string up to 60 characters long.
Facility ID	A positive integer ID, up-to nine digits which uniquely identifies each facility within a particular COABDIS. A facility ID must be specified at the time a facility is added to the database. After that it cannot be changed.
County Name	The name of a county containing each facility. The county name is taken automatically from the COABDIS table.
County ID	A positive integer ID, up-to two digits which uniquely identifies a county. A county ID must be specified when a facility is added to the database and must correspond to one of the counties in the COABDIS table.
Air Basin	A two- or three-character field that uniquely identifies an air basin. An air basin must be specified when a facility is added to the database and must correspond to one of the districts in the COABDIS table.
Air Basin Name	The name of the air basin containing a facility. An air basin must be specified when a facility is added to the database. The air basin name is taken automatically from the COABDIS table.
District	A two- or three-character field that uniquely identifies a district. A district must be specified when a facility is added to the database and must correspond to one of the districts in the COABDIS table.
District Name	The name of a district containing each facility. The district name is taken automatically from the COABDIS table.
Address	Street address where facility is located.
City	City where facility is located.
Zip	Facility Zip code.
Zip Ext.	Facility Zip code extension.
Area Code	Facility telephone area code.

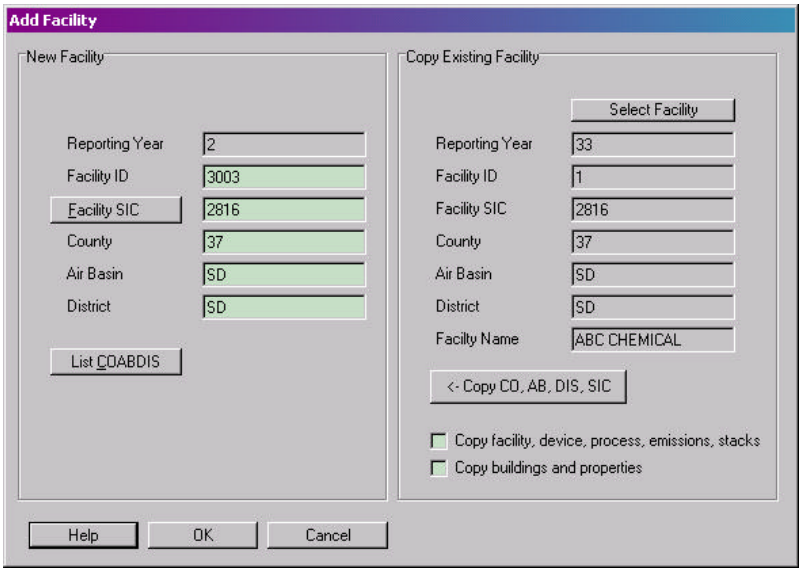
Toxic Program Status	Fee category – this field indicates which category a facility is under. Click on the down arrow to see a list of toxic program status for the facility.
Year of Emission Data	Year in which emissions were estimated.
Year of Risk Data	Year in which risk data were estimated.
Updating Code	Code indicating HARP emissions were updated. Click on the down arrow to see a list of updating codes.
CERR	Consolidated Emissions Reporting Rule. Code indicating which type of the CERR program a facility is classified.
Forecasting	This field is used to indicate whether a facility is used for forecasting purposes. A value of N indicates that this is an NSR facility. Press the button labeled ***Forecasting*** to change the value of this field.
CHAPIS	A check in this field indicates the facility is a CHAPIS facility.
Small Commercial	A check in this field indicates the facility is a small commercial facility.
Maintained by Districts	A check in this field indicates the facility is agreed to be maintained by districts.
Location only	A check in this field indicates this facility only update its location only.
SIC	Source Industrial Code. This is the main activity of the facility.
NAICS	North American Industrial Classification Code. This code will eventually replace the SIC.
Location – East	X_USERCOORD: East to West coordinate provided by the facility.
Location – North	Y_USERCOORD: North to South coordinate provided by the facility.
Coord_system	Coordinate system used. The coordinate system should be specified to define coordinates.
Datum	Datum used. The datum should be specified to define coordinates.
Spheroid	Shape used for ellipsoidal earth. The spheroid should be specified to define coordinates.
Person	Name of the phone contact person for each facility.
Area Code	Three-digit area code phone number.
Phone	Seven-digit facility phone number.
# Employees	Number of employees at the facility.
AIRS AQCR	Air Quality Control Region
Co. Name	Company name. This can be either the parent company of the facility or the facility itself.
Address (Mailing)	Street-mailing address of a facility. If the mailing address is the same as the facility address, it can be copied from the facility address on the

	facility-editing window by pressing the button labeled ***Copy Facility Address***.
City (Mailing)	City where facility is located for mailing purposes. If the mailing address is the same as the facility address, it can be copied from the facility address on the facility-editing window by pressing the button labeled ***Copy Facility Address***.
Attention	Facility contact person for mailing purposes. If the mailing address is the same as the facility address, it can be copied from the facility address on the facility-editing window by pressing the button labeled ***Copy Facility Address***.
FRS_ID	Facility Registry System ID. This field is uniquely assigned by the federal EPA for each facility and is used across different media such as municipal waste and water pollution.
Special Project ID	GEOID for ARB used only.
SO2 Designation	Area designation for S02. Allowable values are: A (attainment), N (non-attainment), T (non-attainment, transitional), U (unclassified). Press the button labeled ***S02 Designation*** to select an allowable value from a list.
PM Designation	Area designation for particulates. Allowable values are: A (attainment), N (non-attainment), T (non-attainment, transitional), U (unclassified). Press the button labeled ***PM Designation*** to select an allowable value from a list.
OZ Designation	Area designation for Ozone. Allowable values are: A (attainment), N (non-attainment), T (non-attainment, transitional), U (unclassified). Press the button labeled ***OZ Designation*** to select an allowable value from a list.
NO2 Designation	Area designation for N02. Allowable values are: A (attainment), N (non-attainment), T (non-attainment, transitional), U (unclassified). Press the button labeled ***N02 Designation*** to select an allowable value from a list.
CO Designation	Area designation for CO. Allowable values are: A (attainment), N (non-attainment), T (non-attainment, transitional), U (unclassified). Press the button labeled ***CO Designation*** to select an allowable value from a list.
Subco. ID	Facility sub-county identifier. If this is entered, it must correspond to one of the subcounty codes in the SUBCO table. You may select a value from a list by pressing the button labeled ***Subco. ID***.
Rec. Proximity	This is the distance from the facility to the nearest receptor for the purpose of calculating facility priority score. You may enter a value directly into the box of the facility-editing window or press the button labeled ***Rec. Proximity*** to have HARP calculate it. Calculation of

	receptor proximity requires that you have already entered facility stack data and property boundary data.
Priority Multiplier	A factor that is used to adjust the prioritization score at a facility. This could be used to increase a facility score if a facility, for example, emits multipathway pollutants or has receptors that are closer than 50 meters.
District FACD1	Reserved for district use.
District FACD2	Reserved for district use.
Toxic Program Phase	Phase at which a facility was brought into HARP. Must be one of the following: P1 (first phase, >=25 TPY), P2 (second phase, >= 10 TPY and <25 TPY; P3 (third phase, <10 TPY). Click the down arrow to view and then choose the correct toxic program phase for the facility.
Industry Wide	This field indicates whether a facility is included in the industry-wide emissions data. Allowable values are: Y (included in industry-wide) and N (not included in industry wide).
Priority for Risk	This field indicates the priority of a facility for risk assessment. Allowable values are: H (high priority), L (low priority) or I (intermediate priority). Press the button labeled ***Priority for Risk*** to change the value of this field.
Exemption Status	Reason for facility to be exempted from the Air Toxics Hot Spots program.
Small Business	Indicates whether facility is a small business.
Year of Prioritization	Indicates the reporting year when the prioritization score was estimated.
Number of SCC used	Indicates the number of SCC used at the facility. This field is used to classify a facility for fee purpose.
HRA Cancer	Health Risk Assessment, cancer potency number calculated for the facility.
Chronic HI	Chronic hazardous index (HRA) score calculated for the facility.
Acute HI	Acute hazardous index (HRA) score calculated for the facility.
Last Update	The data when this record was last modified. For facility records, this field is updated whenever any subordinate record is updated. Subordinate records are devices, processes, emissions or stacks that belong to the facility.

5.9 Adding a New Facility

To add a new facility to the database, select ***Add*** from the menu. The following dialog box will appear.



In order to add a facility record you must provide values for each of the fields shown in this dialog box. The Facility ID, County, Air Basin and District are all key fields, which must comprise a unique combination within the database. The Facility SIC is the SIC code associated with this facility and is also a required field, though it is not part of the key.

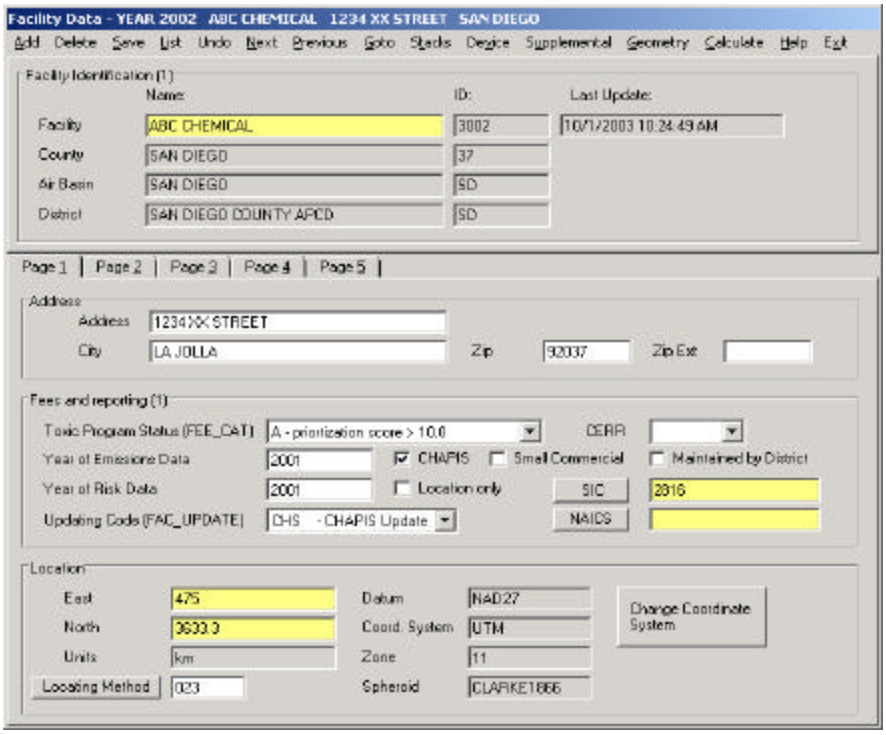
The Facility ID may be any nine-digit positive integer number that uniquely identifies this facility within the selected COABDIS (County, Air Basin, District).

The button labeled ***Facility SIC*** can be used to select from a list of all of the allowable facility SIC codes.

The button labeled ***List COABDIS*** can be used to display a list of allowable County, Air Basin, District code combinations.

When you have entered values for all fields in this dialog window, press ***OK***. HARP will then validate your entries. Note: you can only exit this dialog window by providing valid entries for all fields or by pressing the ***Cancel*** button. If you press ***Cancel***, no facility record will be added and you will return to the facility-editing window.

If all values are valid, the following facility window will appear. Note that the facility data window has been completed with fictitious data in this guide. This facility window consists of five pages. When a facility is added or edited, you will always see the first page with general information of a facility. You should go over every page on the facility window and fill in the requested information. Refer to section 5.8 for descriptions of fields on this window.



On page 1 of the facility window, under the "Fees and reporting" section, enter a "toxic program status" for this facility. Click on the down arrow button and select an appropriate fee category. Similarly, pressing the down arrow button on the "updating code" for the facility will help determine when the facility last updated their data.

If data was provided to update CHAPIS information, select CHS – CHAPIS update. If you are submitting location data only such as facility name and address for this facility, check the "location" box. Examples of this facility type include metal platers and dry cleaners.

Select an appropriate Consolidated Emission Reporting Rule (CERR) and report it in the CERR box. If a facility is classified as a type A facility, stack ID are required for all release points. For type B facility, stack coordinates and parameters such as stack high and stack flow rate are required. Please refer to http://www.epa.gov/ttn/chief/cerr/cerr.pdf for a better description of the CERR requirements.

If you do not know the SIC or NAICS codes, click on the field button and a drop down window will appear listing available SIC or NAICS codes. Type a word or a partial word and then click ***Search for string***, the search is narrowed down so you can choose an appropriate SIC. Once a SIC is chosen, highlight the row and click OK. The chosen SIC is then transferred to the SIC input area. ***SIC is a "Not Null" required field. You should enter an SIC for the facility to be saved in the database.***

The coordinates that are entered for the location of the facilities and the stacks may be expressed in any of four coordinate systems. The coordinate system that you have chosen is shown in the grayed out boxes on the lower right portion of the window, as illustrated below. You may

change your preference for the coordinate system or convert from one coordinate system to another by clicking the button labeled "Change Coordinate System". For information on changing coordinate systems, see section 5.9.1.

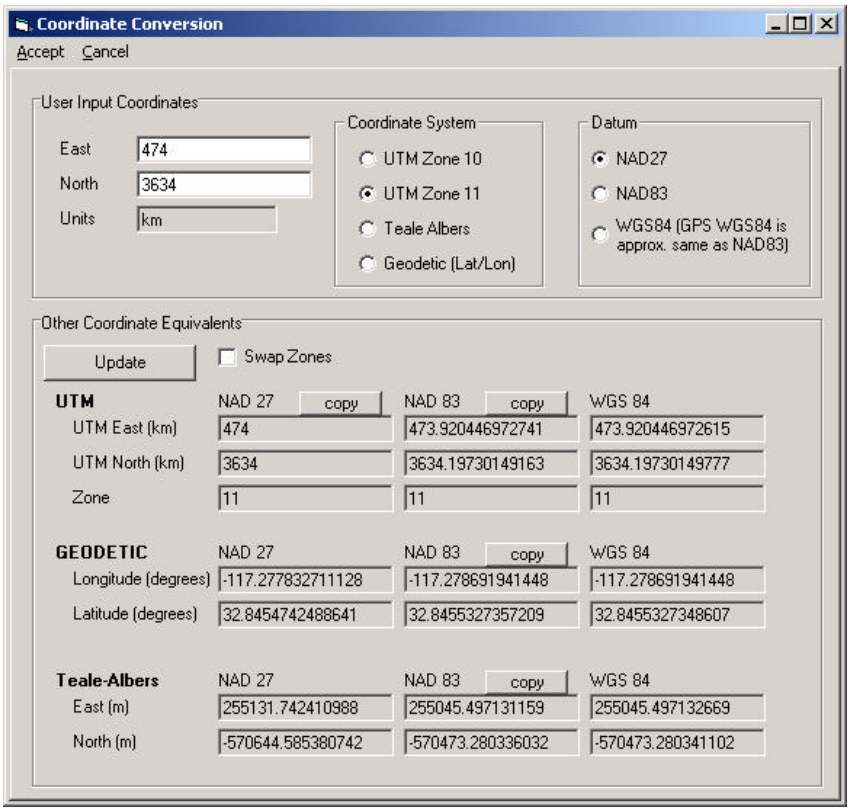
Page 2 is self explanatory, except for the EPA Facility Registry System ID. This field is a unique ID across different media such as air and waste and is assigned by the U.S. Environmental Protection Agency. If your facility is new and has never been inventoried, we'll request an ID for you.

On page 3, the status designation for each criteria pollutant is by the county level. If your facility is within an attainment area for any of the pollutants, designate it as indicated.

Page 4 and 5 are self-explanatory.

5.9.1 Facility and Stack Coordinate Conversions

When you click the "Change Coordinate System" button, the window shown below will appear.



To specify that the coordinates you have entered be expressed in a different system, click the appropriate radio buttons in the boxes labeled "Coordinate System" and "Datum", and then click ***Accept*** on the menu. This will not change the values that you have entered; it will only change how the program interprets them. You may also edit the coordinate values themselves on this window, or you may edit them on the facility window after this window is closed.

For example, if you know that the geodetic coordinates in the NAD83 datum are 33 degrees north latitude and 117 degrees east longitude, then click the Geodetic button and the NAD83 button, and enter the values of 33 for North and –117 for East. Then press **Accept**. Note that negative values for the east coordinate are required for east longitude (i.e. all longitudes in the United States have negative values).

Now suppose that you want to convert the coordinates shown in the figure above from UTM, ZONE 11, NAD27 to geodetic. First, if you have made any changes to the "User Input Coordinates" or the coordinate system and datum options since you first opened this window, then you must click the button labeled "Update". This updates the values of the "Other Coordinate Systems" shown on the bottom portion of the window. Then click any one of the four "Copy" buttons to copy the "other coordinates" to the "user coordinates". In this example, you would click the copy button next to geodetic NAD83. Then click the ***Accept*** button.

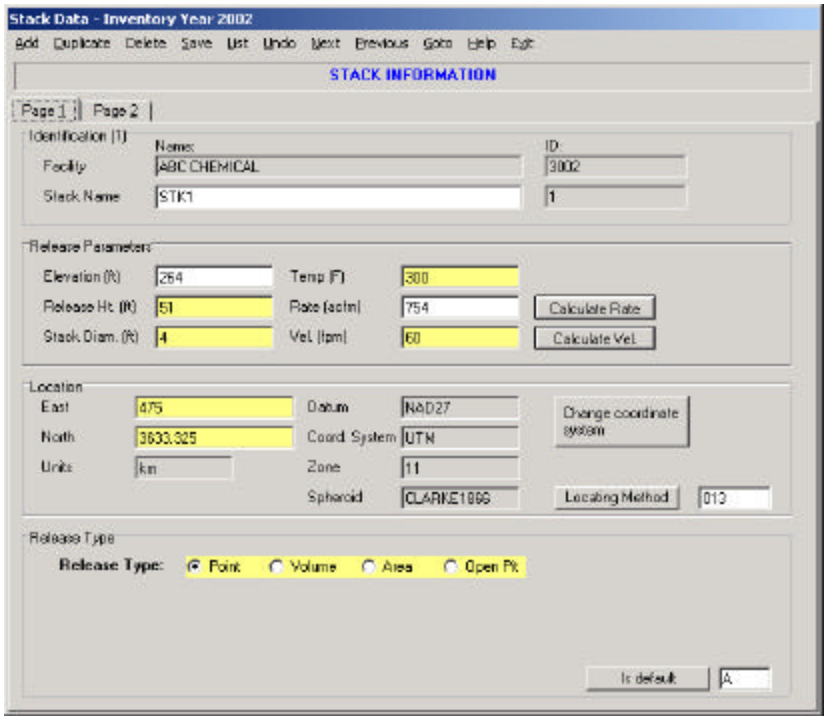
5.10 Stack Data Window

A stack is where the emissions are released into the atmosphere. Stack is also defined as an emission release point; therefore, every process must have an associated stack, whether it is a point, area or volume source, or an open pit. ***You need to assign a stack ID and associate it with every process within your plant***. Depending on the stack type, associated stack parameters should be provided.

Before you can edit stack data you must first choose a facility by selecting ***Edit Data/Facilities and Emissions*** from the main menu. For information on editing facility data refer to section 5.9.

The stack data window is used to edit data contained in the stack table. To edit stack data select ***Stack*** from the facility data window. If there is no stack data in the database for the currently selected facility, HARP will display a warning message and the stack window will be blank.

The stack data window appears as shown below. The following sections describe the data fields. Refer to section 5.7.2 for descriptions of the menu options.



5.10.1 Stack Data Field Descriptions

When you add a new stack or edit an existing stack record, the names and IDs of the facility, county, air basin and district are automatically set to the same values as the facility that contains that stack. The following is a description of the other data fields in the stack-editing window.

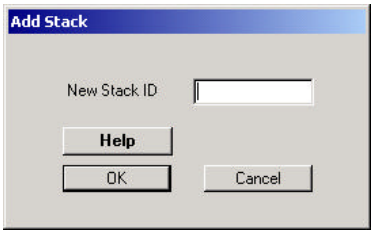
Certain parameters listed below are specific to the type of release point. For example, temperature and velocity only apply to point sources. Only the input variables that apply to the selected release type are shown on the window.

Stack Name	The descriptive name of a stack. This may be any string up to 60 characters.
Elevation	Elevation of the base of a stack in feet – distance above sea level.
Release Height	Stack height in feet, from the base of the stack.
Stack Diam	Stack diameter at exit in feet.
Temperature	Actual gas temperature as exit in degrees F. Must be a number between 50 and 2,500.
Rate	Actual gas flow rate in cubic feet per minute (CFM).
Calculate Rate (button)	When you press this button, HARP calculates and displays the gas flow rate from the velocity and stack diameter.

Calculate Velocity (button)	When you press this button, HARP calculates and displays the gas exit velocity from the flow rate and stack diameter.
Velocity	Actual gas velocity at exit in ft/min.
East	East to West coordinate of the stack.
North	North to South coordinate of the stack
Release Type	Type of release: point, volume, area, or open pit.
Width of vol. Source (Lateral Dimension)	Corresponds to the parameter SYINIT for a volume source. Refer to the ISC documentation, Volume II.5, Table 1-6. Note: In HARP, the user must divide the width of the volume source by the appropriate factor (e.g., 4.3), and then enter the quotient into HARP.
Height of vol/area source (Vertical Dimension)	Corresponds to the parameter SZINIT for an area source. Refer to the ISC documentation, Volume II.5, Table 1-6. Note: In HARP, the user must divide the height of the source by the appropriate factor (e.g., 2.15), and then enter the quotient into HARP.
X width of area/pit source	Corresponds to the parameter XINIT for an area or open pit source. Refer to the ISC documentation.
Y width of area/pit source	Corresponds to the parameter YINIT for an area or open pit source. Refer to the ISC documentation.
Angle of area/pit source	Corresponds to the parameter ANGLE for an area or open pit source. Refer to the ISC documentation.
Volume of open pit	Volume of an open pit source. Refer to the ISC documentation.
IsDefault	Are any values in the stack data defaulted?
Last Update	Date any stack data are updated.

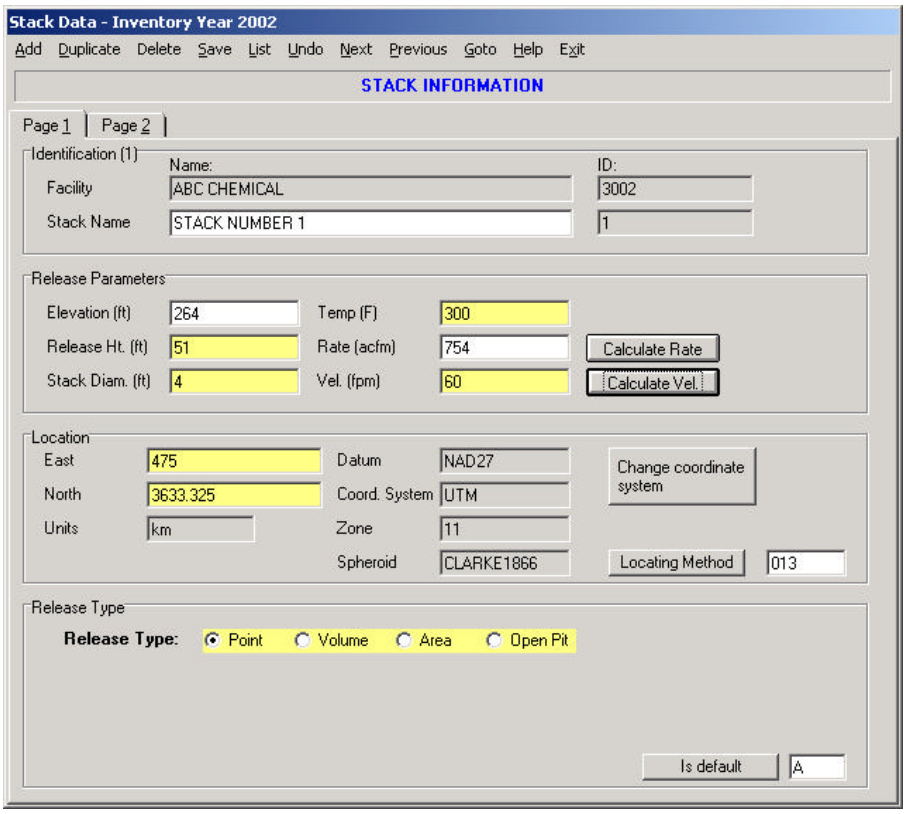
5.10.2 Adding a New Stack Record

To add a new stack to the database, select ***Add*** from the menu of the stack data window. The following dialog box will appear.



In order to add a stack record you must provide a new stack ID. The stack ID must be a positive integer number, up-to-six digits that is unique for the current facility. When you have entered the new device ID, press ***OK***. HARP will then validate your entry. You can only exit this dialog window by providing a valid stack ID or by pressing the ***Cancel*** button. If you press

Cancel then no stack record will be added and you will return to the facility data window. Let's suppose you have provided a valid stack ID for the current facility. A stack data window appears as follow:



The stack data window will always default to a point source release. If the stack diameter and velocity of the exit gas are provided, pressing the ***Calculate Rate*** button will automatically fill in the rate. If the stack diameter and the rate are provided, pressing the ***Calculate Velocity*** button will automatically fill in the exit gas velocity.

Similar to the facility data window, the coordinates that are entered for the location of the stacks may be expressed in any of four coordinate systems. The coordinate system that you have chosen is shown in the grayed out boxes on the lower right portion of the window. On the stack window there is a button that allows you to convert the stack location from one coordinate system to another. This button functions exactly the same way as the corresponding button on the Facility window. For a description of this function, refer to section 5.9.1.

Note: Every stack should be identified with a set of coordinates regardless of the release type.

Depending on the type of release (whether it is a point, volume, area source, or an open pit) certain parameters should be provided. Refer to section 5.10.1 for descriptions of fields to be entered. Select the volume and the HARP screen will be updated to reveal appropriate stack data fields. Enter stack data for a volume source. Select area if the release point is an area

source, such as a pond, and enter the appropriate data. Select open pit if the release point is an open pit. Enter appropriate data for this open pit.

On page 2, address any comments regarding the stack entered in the memo field.

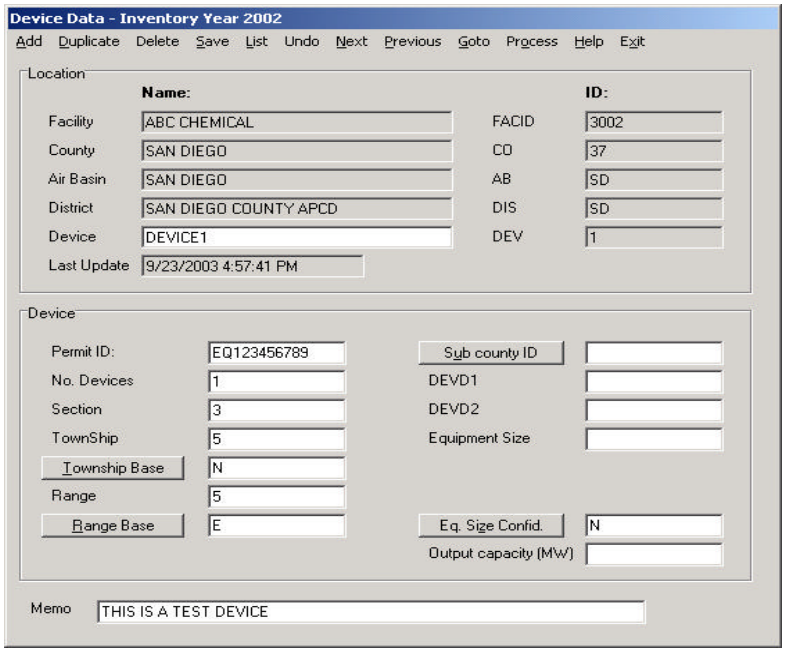
5.11 Device Data Window

A device is a piece of equipment used in any process. For example, a boiler used in a distillate oil combustion process or a paint booth used in a painting process. A facility can have many devices, each identified by a positive integer, up to six digits. A device can have up to 99 processes, each identified by a process ID – PROID. For example, a boiler can burn distillate oil at one time and residual oil at another time. Therefore, one process can be classified as a distillate oil combustion process while another is a residual oil combustion process.

Before you can edit device data you must first select a facility by selecting ***Edit Data/Facilities and Emissions*** from the main menu. For information on editing facility data refer to section 5.9.

The device data window is used to edit data contained in the device table. To edit device data select ***Device*** from the facility data window. If there is no device data in the database for the currently selected facility and reporting year, HARP will display a warning message and the device window will be blank. You must add a device record to a facility before you can enter any process or emissions data for that facility. To add a device, refer to section 5.11.2.

The device data window appears as shown below. The following sections describe the data fields. Refer to section 5.11.1 for descriptions of the menu options.



DEVICE WINDOW

5.11.1 Device Data Field Descriptions

When you add a new device or edit an existing device record, the names and IDs of the facility, county, air basin and district are automatically set to the same values as the facility that contains that device. The following is a description of the other data fields on the device-editing window.

Device Name	The descriptive name of a device. The name can be any alphanumeric string up to 40 characters long.
Device ID	A positive integer ID (up-to-six digits) which uniquely identifies each device within a particular facility and COABDIS. A device ID must be specified at the time a device is added to the database. After that it cannot be changed.
Permit ID	Local permit ID.
No. Devices	Number of devices represented by this record. If there are exactly the same types of devices at the facility, write the number of devices here and aggregate processes and emissions for these devices.
Section	Section location of this device. Must be an integer number from 1 to 36.
Township	Township location of this device. Must be an integer number from 1 to 50
Township Base	Township base. Must be one of the following values: N (north), S (south). Press the button labeled ***Township Base*** to change the value of this field.
Range	Range location of this device. Must be an integer number from 1 to 50
Range Base	Range location base for this device. Must be one of the following values: E (east), W (west).
Subcounty ID	Device subcounty identifier. If this is entered, it must correspond to one of the subcounty codes in the SUBCO table. You may select a value from a list by pressing the button labeled ***Subcounty ID***.
DEVD1	An alphanumeric field of up to forty characters, reserved for district use.
DEVD2	An alphanumeric field of up to forty characters, reserved for district use.
Equipment Size	A numerical value of the equipment size ranging from 0 to 999999.9. The units of measurement depend on the value of Equip. Size Units.
Equip. Size Units	Equipment size units code. This is an integer number that must be taken from the EQSIZEUNIT table. This field is to be used in the future. It is recommended that this field be left blank for the time being.
Equipment Type	Equipment type code. This is an integer number that must be taken from the EQTYPE table. This field is to be used in the future. It is recommended that this field be left blank for the time being.
Eq. Size Confid.	Equipment size confidential flag. Allowable values for this field are: Y (equipment size is confidential), N (equipment size is not confidential).

Output Capacity — Device output capacity in megawatts. Any number up to 9999.99 is valid. This field is designed to store a device output capacity at any power plant.

5.11.2 Adding a New Device

To add a new device to the database, select ***Add*** from the menu of the device data window. The following dialog box will appear.

In order to add a device record you must provide a new device ID. The device ID must be a positive integer, up-to-six digits that is unique for the current facility.

When you have entered the new device ID, press ***OK***. HARP will then validate your entry. You can only exit this dialog window by providing a valid device ID or by pressing the ***Cancel*** button. If you press ***Cancel***, no device record will be added and you will return to the device data window. Information on the device data window is self-explanatory. Please refer to section 5.11.1 for device data field descriptions.

To enter process information, select ***Process*** from the device data window. Refer to the next section for the process data window.

5.12 Process Data Window

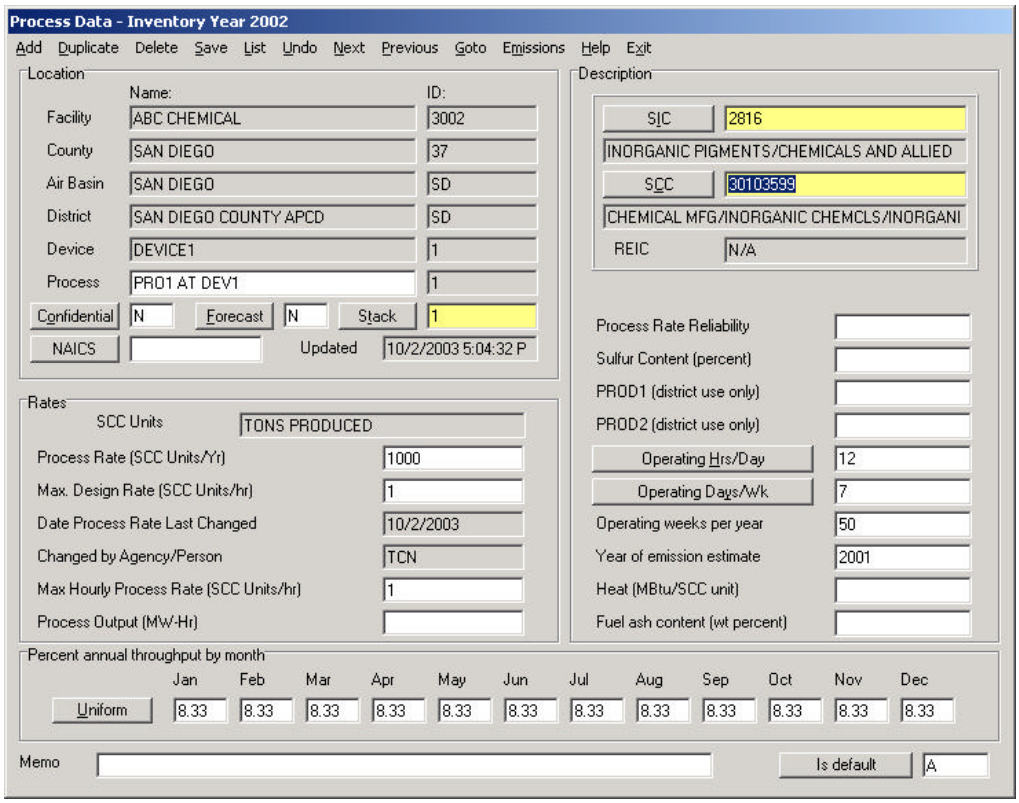
A process can be defined as an activity at the device or equipment. For example, an activity can be an incineration, soldering, painting, or plating process. HARP identifies processes using PROID. As mentioned in section 5.11, a device can have as many as 99 processes, each identified by a PROID. This section describes the process data window in detail.

Before you can edit process data you must first choose a facility by selecting ***Edit Data/Facilities and Emissions*** from the main menu. You must then choose a device by selecting ***Device*** from the facility data window. For information on editing facility data refer to section 5.9. For information on editing device data refer to section 5.11.

The process data window is used to edit data contained in the process table. To edit process data, select ***Process*** from the device data window. If there is no process data in the database for the currently selected facility, device and reporting year, HARP will display a warning message and the process window will be blank. You must add a process record to a

facility before you can enter any emissions data for that facility. To add a process, refer to section 5.12.2.

The process data window appears as shown below. The following sections describe the data fields. Refer to section 5.7.2 for a description of the menu options.



5.12.1 Process Data Field Descriptions

When you add a new process or edit an existing process record, the names and IDs of the facility, county, air basin, district and device are automatically set to the same values as the device that contains that process. The following is a description of the other data fields on the process-editing window.

Process Name	The descriptive name of a process. The name can be any alphanumeric string up to 60 characters long.
Process ID	A positive integer ID, up to two digits, which uniquely identifies each process within a particular facility, device and COABDIS. A process ID must be specified at the time a process is added to the database. After that it cannot be changed.
Confidential	This flag field identifies whether the process is confidential. Allowable values for this field are: Y (process data is confidential), N (process data is not confidential). A "Y" on this field signifies that other related data

	such as emission factor and design rate are confidential and will not be released outside of the Air Resources Board.
Forecast	Process specific forecast indicator. Domain for this field is N for new source review (NSR) and null. An "N" indicates that the process is a NSR process related for forecasting purpose.
Stack	The ID of the stack to which this process is physically connected. The ID must correspond to one of the stacks already defined for the facility. Press the button labeled ***Stack*** to select from a list of valid stacks. ***It is important that each process be associated with a stack. If you do not enter a stack ID in this field, we will assume that this is a fugitive source and will assign an associated stack ID for it***.
SCC Units	SCC units are automatically set when the SCC is chosen. This field is taken directly from an SCC table and the user does not need to enter it.
Process Rate	This is the process rate in SCC units. If this field is entered, along with the emission factor, annual emissions for the process will be calculated.
Max Design Rate	Maximum design rate.
Date Process Rate Last Changed	Date on which the process rate field in the database was last changed. This is automatically updated by HARP.
Changed by Agency/Person	The person who last changed the process rate in the database. This is automatically updated by HARP using the initials that you enter when you log onto the system.
Unreconciled Process Rate	Unreconciled areawide source process rate. This only applies to areawide sources.
Max. Hourly Process Rate	Maximum hourly process rate in SCC units per hour. The greatest operating rate that would be expected for the source in a one-hour period.
SIC	This is the standard industrial classification code that best describes the industrial activity at the process level. Press the button labeled SIC to select from a list of valid codes. ***This is a "not null" (required) field in HARP and therefore must be entered by the user.***
SCC	This is the process source classification code (SCC) which closely corresponds to a process. Press the button labeled SCC to select from a list of valid codes. ***This is also a "not null" (required) field in HARP and therefore must be entered by the user.***
EIC Code	This field is an Emission Inventory Code (EIC) for areawide sources. HARP generates this Code when a process ID is chosen. Areawide sources should already have been populated with previous emission inventory data. You cannot add an areawide source category. Contact the ARB for assistance if you need to create an EIC.
EICSUMN	This field describes the summary of the areawide source for the EIC and is computer generated.

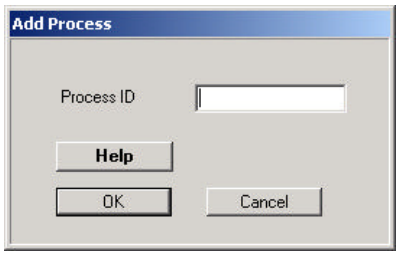
EICSOUN	This field describes the source of the areawide source for the EIC and is computer generated.
EICMATN	This field describes the material used in the EIC and is computer generated.
REIC	This is the reconciled EIC code used by the ARB to reconciled emissions between areawide and point sources. If the entered SIC/SCC combination is valid, a REIC will display. If it is not and you strongly believe it is a valid combination, the ARB will assign a valid code for it. This code is displayed from the ***category*** table for your information.
Process Rate Origin Code	This field is to be used in the future.
Process Rate Reliability	Process rate reliability. This must be an integer number of no more than 3 digits.
Sulfur Content	Fuel sulfur content expressed as a percentage and is only applicable to liquid fuel such as distillate or residual oils. This field must be between 0.0 and 3.0.
Spatial Distribution Parameter	This field is numerical spatial distribution parameter and is applied only to areawide sources.
PROD1	This is an alphanumeric field of up-to-forty characters reserved for district use.
PROD2	This is an alphanumeric field of up-to-forty characters reserved for district use.
Operating Hrs/Day	Code used to specify number of operating hours per day. Press the button labeled ***Operating Hrs/Day*** to select from a list of valid codes.
Operating Days/Wk	Code used to specify number of operating days per week. Press the button labeled ***Operating Days/Wk*** to select from a list of valid codes.
Operating weeks per year	Number of operating weeks per year.
Agency Making Areawide Source Estimate	This is an alphanumeric field of up to six characters identified the name of the agency making the areawide source estimate and is applied to areawide sources only.
Year of Emission Estimate	Year in which the process/emission estimate was made. Must be between 1980 and the current year.

5.12.2 Adding a New Process

The procedures for adding a new process record are slightly different depending on whether you are editing stationary point data or areawide source data. If you selected *Edit Data/Facilities and Emissions* from the main menu, then you are editing stationary point data.

5.12.3 Adding a Stationary Point Process

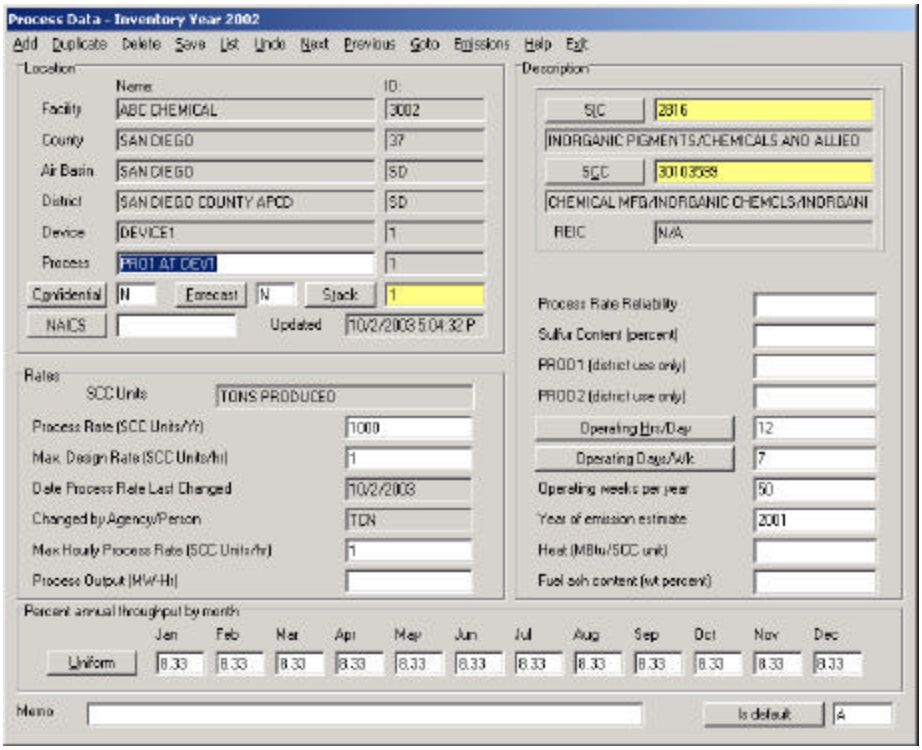
To add a new stationary point source process to the database, select ***Add*** from the menu of the process data window. The following dialog box will appear.



In order to add a process record you must provide a new process ID. The process ID must be an integer number that is unique for the current facility and device. When entering stationary point data, the process ID must be a number from 1 to 99. If you are entering areawide source data the process ID must be a valid EIC code.

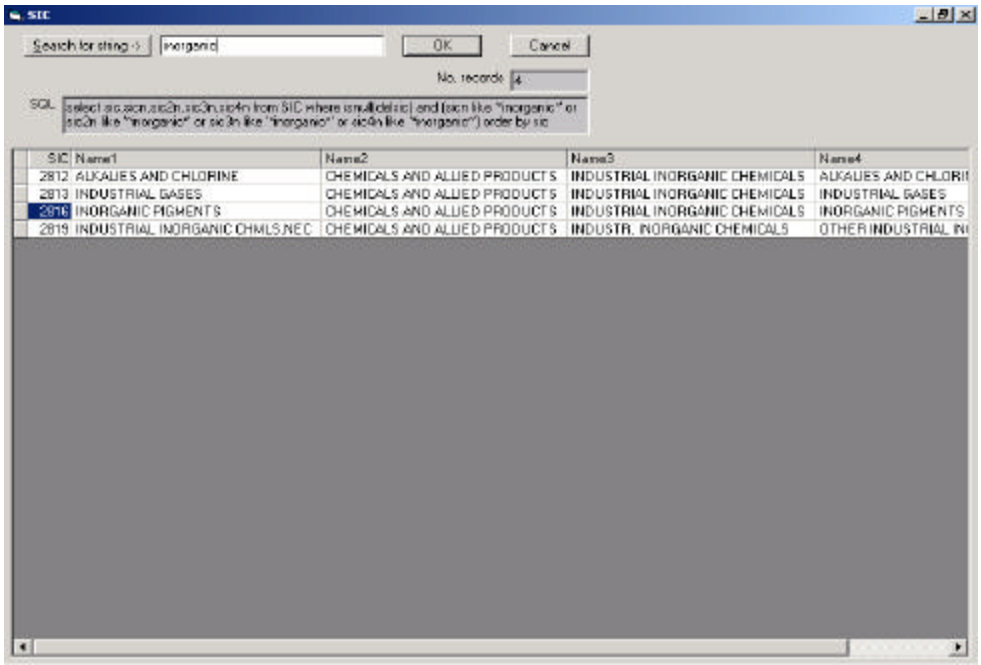
When you have entered the new process ID, press ***OK***. HARP will then validate your entry. You can only exit this dialog window by providing a valid process ID or by pressing the ***Cancel*** button. If you press ***Cancel*** then no process record will be added and you will return to the process data window.

An example of a completely filled in process data window is shown here:



The gray-fields are computer generated and cannot be edited here. Refer to section 5.12.1 for process data field descriptions in the process data window. ***You must enter a stack ID in the stack field to identify the emission release point. Otherwise, these emissions will be assigned as fugitive with an ARB-assigned stack ID***. In this case, it is likely that the facility's coordinates would also be assigned for the stack location. If stack ID were created and data were entered previously, click the "stack" button to access a list of available stacks. Select an associated stack for this process and click OK. This stack ID is transferred to the stack field.

You should enter a process rate in an SCC unit if you want to calculate annual emissions using the soon-to-be supplied emission factor in the emission data window. You must enter a SIC and a valid SCC to save this process since these fields are "not null" fields. If the SIC for this process is not known, press the SIC button and the drop-down window will help you choose an appropriate SIC. In the following example, the SIC button is pressed and a process involving inorganic pigment is searched. After entering the word "inorganic" and pressing the "Search for string" button, the following window appears. Note that the computer searches SICN, SIC2N, SIC3N, and SIC4N for the word "inorganic". Therefore, all SICs containing the word "inorganic" are shown.



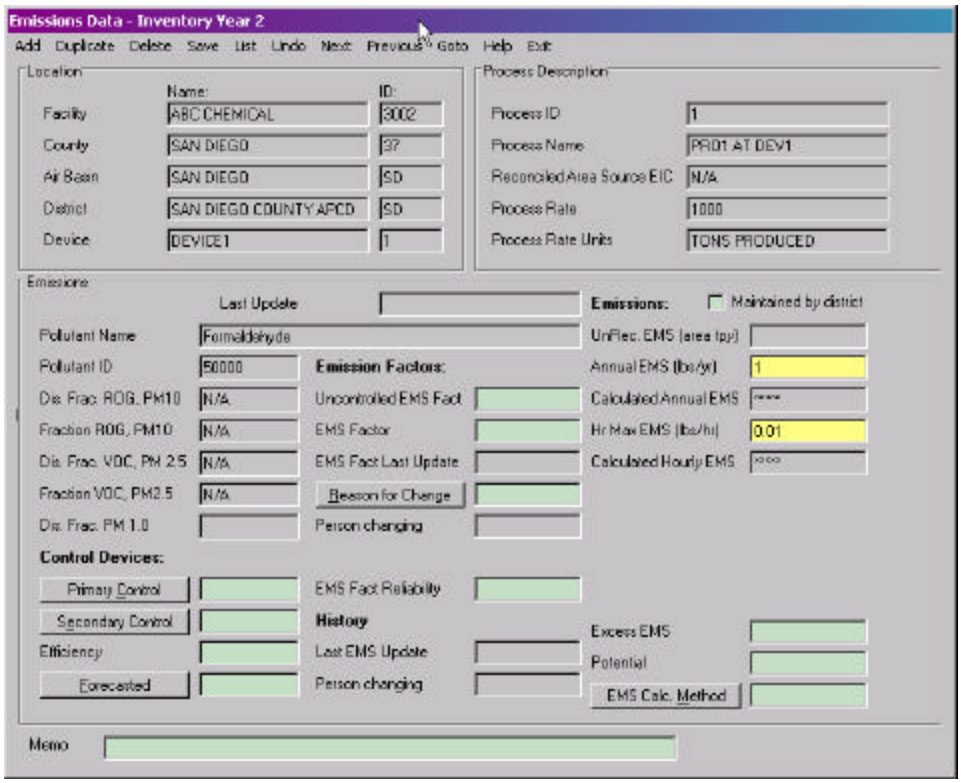
Similarly, you can search for any SCC code in the SCC table by pressing the SCC button and follow the on-screen instructions. If you are only entering data for risk assessments purposes, 9999 (unknown) can be added for the SIC code, and 99999999 for SCC code.

If the process operates uniformly throughout the year, click the ***Uniform*** button and the percentage for each month will automatically be filled in. Refer to section 5.12.1 for process data field descriptions.

5.13 Emissions Data Window

Before you can edit emissions data for a point source you must first choose a facility by selecting ***Edit Data/Facilities and Emissions*** from the main menu. You must then choose a device by selecting ***Device*** from the facility data window, and a process by selecting ***Process*** from the device data window. If you are entering data for areawide sources, you can get to the process window by selecting ***Edit Data/Areawide (Regional) Sources*** from the main menu.

For information on editing facility data refer to section 5.9. For information on editing device data refer to section 5.11. For information on editing process data refer to section 5.12. The emissions data window appears as follows.



The emissions data window is used to edit data contained in the emission table. To edit emission data, select ***Emissions*** from the process data window. If there is no emissions data in the database for the currently selected facility, device, process and reporting year, HARP will display a warning message and the emissions window will be blank. To add an emissions record, refer to section 5.13.2.

The following sections describe the data fields. Refer to section 5.7.2 for descriptions of the menu options.

5.13.1 Emissions Data Field Descriptions

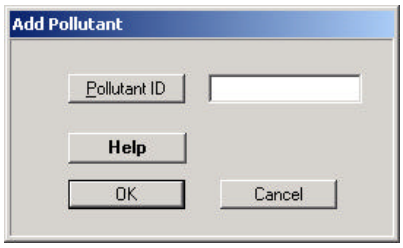
When you add a new emission record or edit an existing emission record, the names and IDs of the facility, county, air basin, district, device and process are automatically set to the same values as the process that contains those emissions. The following is a description of the other data fields on the emissions editing window.

Pollutant Name	The name of the pollutant being emitted. HARP fills this in automatically so that it corresponds to the pollutant ID on the emission-editing window.
Pollutant ID	An ID that uniquely identifies each emitted pollutant within a particular facility, device, process and COABDIS. A pollutant ID must be specified at the time an emission record is added to the database. After that it cannot be changed. The pollutant ID must correspond to one of the pollutants in the POLLUTANT table.
Cal. Frac ROG/PM10	This is a specified ROG or PM_{10} fraction from the provided TOG, ROG, PM, and PM_{10} emissions. This field is grayed out and is for information only. If the district does not provide ROG or PM_{10} emissions records, HARP will automatically calculate these emissions using ARB default fractions. In this case, the "Cal. Frac. ROG/PM10" and the "Fraction ROG/PM10" will be the same.
Fraction ROG/PM10	ARB default fraction for ROG or PM_{10} or NOx. HARP fills this in automatically from the fraction table.
Cal. Frac. VOC/PM 2.5	This is a specified VOC or $PM_{2.5}$ fraction from the provided TOG, VOC, PM, or $PM_{2.5}$ emissions. This field is grayed out and is for information only. If the district does not provide VOC or $PM_{2.5}$ emissions records, HARP will automatically calculate these emissions using ARB default fractions. In this case, the "Cal. Frac. ROG/PM10" and the "Fraction ROG/PM10" will be the same.
Fraction VOC/PM 2.5	ARB default fraction of VOC or $PM_{2.5}$. This number is for information only.
Primary Control	Primary pollutant control device code. This must be a number taken from the CNTLDEV table. Press the button labeled Primary Control to select from a list of valid codes.
Secondary Control	Secondary pollutant control device code. This must be a number taken from the CNTLDEV table. Press the button labeled Primary Control to select from a list of valid codes.
Efficiency	Control efficiency expressed as a percentage. This field must be a number between 0.0 and 100.0.
Forecasted	Pollutant specific forecast indicator. This may be left blank or set to R to indicate that this is a South Coast AQMD "reclaim" pollutant. Press the button labeled ***Forecast*** to change the value of this field.

UnRec. EMS	This field is for unreconciled areawide emissions and is applied to areawide sources only. If the unreconciled process rate was revised, you should also revise this field.
Uncontrolled EMS Factor	This is an uncontrolled emission factor. The unit for this field is either lb per SCC unit or any appropriate units used in the reported emissions.
EMS Factor	This is the actual emission factor and is used to calculate annual emissions.
Annual EMS	This is the reported annual emissions for each entered pollutant. Units are tons/year for criteria pollutants, lbs/year for toxics, and curies/year for radionuclides.
Calculated Annual EMS	HARP calculates and displays this field for your reference and validation. They are calculated using the process rate and the emission factor data provided.
Hr. Max. EMS	Hourly maximum emissions. Units are lbs/hour, except for radionuclides which are in millicuries/hour.
Calculated Hourly EMS	The hourly maximum emissions are calculated by HARP and displayed for your reference and validation. They are calculated from the maximum hourly process rate and emission factor.
Excess EMS	Total excess emissions. Units are tons/yr for criteria pollutants, lbs/yr for toxics, and curies/yr for radionuclides.
Potential	Potential emissions for districts' use. Units are tons/yr for criteria pollutants, lbs/yr for toxics, and curies/yr for radionuclides.
EMS Calc. Method	Emission calculation method code. This is an integer number that must correspond to one of the values in the DEFMETH table.
Last EMS Update	Date on which the annual emission rate was last updated in the database.
Person Changing	The person who last changed the annual emission rate in the database. This is automatically updated by HARP using the initials that you enter when you log onto the system.

5.13.2 Adding a New Point Source Emission Record

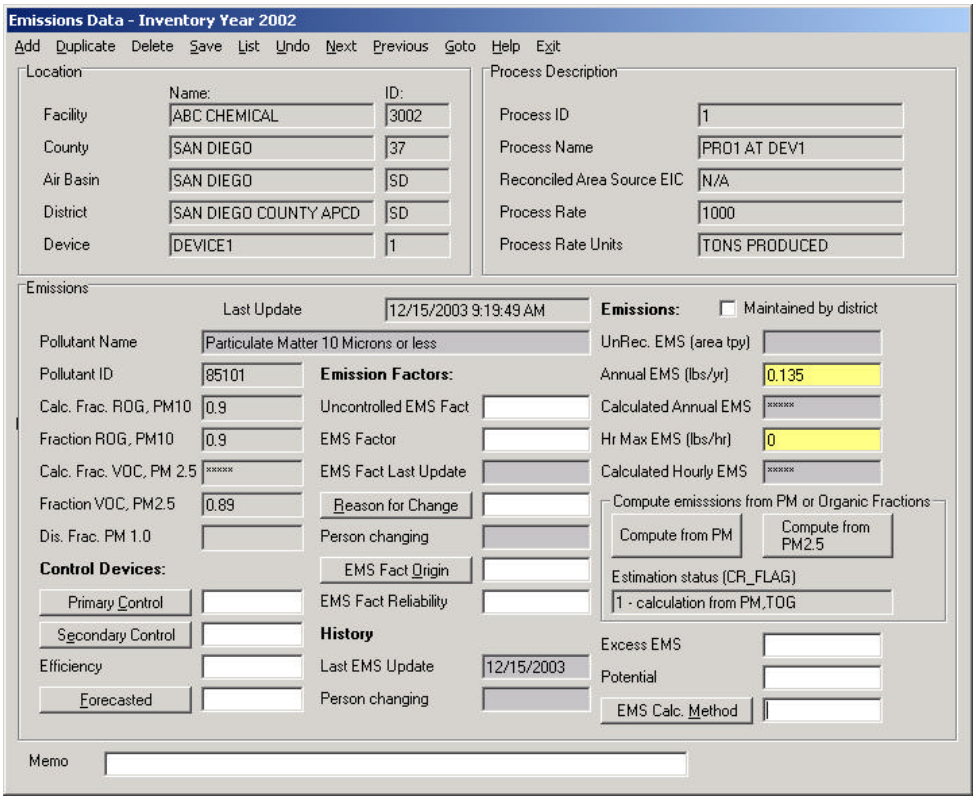
To add a new point source emissions record to the database, select ***Add*** from the menu of the emissions data window. The following dialog box will appear.



In order to add an emissions record you must provide a new pollutant ID. Pollutant IDs are either the same as the CAS numbers or SAROAD codes. If you do not know the pollutant ID, press the ***Pollutant ID*** button to select one from a list. ***Reminder: Not all of the substances in the database have health values (cancer, chronic, acute). Therefore if you plan on performing a risk analysis, make sure you have chosen the substance with the correct health value. Pollutant IDs are unique to each substance, except for carbon monoxide which is listed as 42101 (SAROAD for criteria pollutant) and 630080 (CAS number for toxics). You should always select 42101 when entering emissions for carbon monoxide unless you want to perform risk analysis for a facility using carbon monoxide. In this case select 630080 as carbon monoxide.*** In addition, HARP also contains all health factors listed in the OEHHA Guidance Manual (even if the substance is not listed in the EICG document). These substances can be added by typing the substance name directly into the Add Chemicals window.

When you have entered the new pollutant ID, press ***OK***. HARP will then validate your entry. You can only exit this dialog window by providing a valid pollutant ID or by pressing the ***Cancel*** button.

As an example, the following is a complete emission data window for a point source. Refer to section 5.13.1 for emission data field descriptions. Since particulate matter categories (PM, PM_{10}, or $PM_{2.5}$) are unique, we chose PM_{10} in this example for reference.

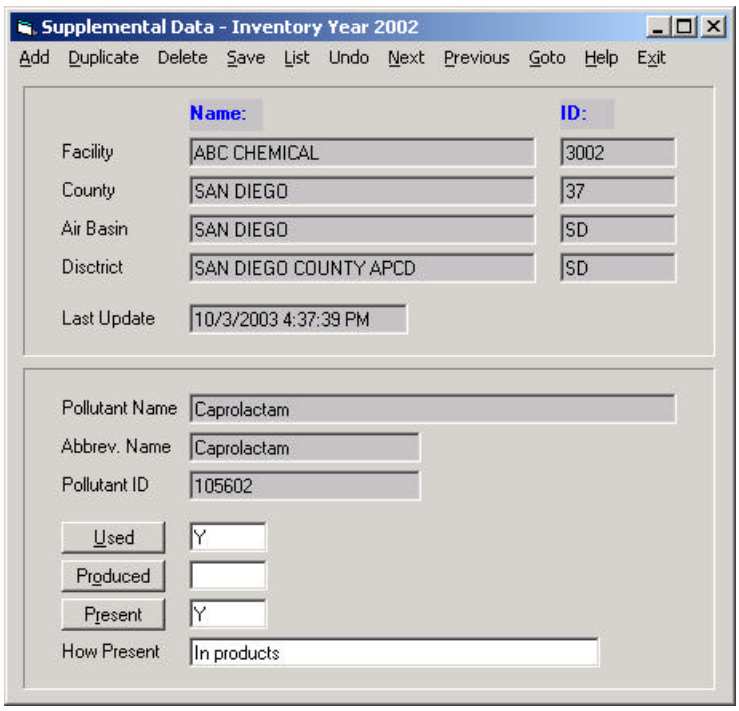


If we assume primary control, secondary control, and other data have been entered; the user still needs to report annual emissions for this pollutant. If you enter annual PM_{10} emissions, the "Cal. Fraction ROG, PM10" and "Fraction ROG, PM10" will be filled in. If you do not have emissions data for PM_{10}, you can calculate it using the reported PM emissions and the ARB default fraction. In this case, click the "Calculate from PM" and the PM_{10} will be calculated. Please also note the "Cal. Fraction ROG, PM10" and "Fraction ROG, PM10" are filled and they are the same.

5.14 Supplemental Process Data Window

The supplemental process data window is used to enter supplemental process parameters to describe substances used, produced or otherwise present. This applies to substances that are emitted in quantities below the applicable degree of accuracy for the facility or other substances that are required to be reported (but not quantified) by the Emissions Inventory Criteria and Guidelines Regulation (Title 17 CCR, section 93300.5). The supplemental process data window can also track facilities whose activities are small enough that they do not result in reportable emissions.

Before you can edit supplemental process data, you must first choose a facility by selecting ***Edit Data/Facilities and Emissions*** from the main menu. For information on editing facility data refer to section 5.9.



The supplemental data window is used to edit data contained in the S_UP table. To edit supplemental data, select ***Supplemental*** from the facility data window. If there is no supplemental data in the database for the currently selected facility, HARP will display a warning message and the supplemental data window will be blank.

The next sections describe the menu options and data fields.

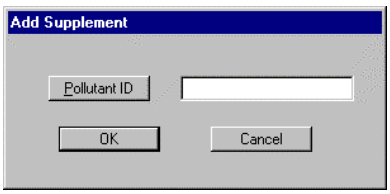
5.14.1 Supplemental Data Field Descriptions

When you add a new supplemental record or edit an existing supplemental record the names and IDs of the facility, county, air basin and district are automatically set to the same values as the facility to which this record refers. The following is a description of the other data fields on the supplemental editing window.

Pollutant Name	The name of the pollutant being emitted. HARP fills this in automatically so that it corresponds to the pollutant ID on the supplemental process data-editing window.
Pollutant ID	An ID that uniquely identifies each emitted pollutant. A pollutant ID must be specified at the time a supplement record is added to the database. The pollutant ID must correspond to one of the pollutants in the POLLUTANT table.
Abbrev. Name	The name of the pollutant being emitted. HARP fills this in automatically so that it corresponds to the pollutant ID on the supplemental process data-editing window.
Used	A flag indicating whether this substance is used. Allowable values for this field are: Y (this substance is used), N (this substance is not used). Press the button labeled ***Used*** to change the value of this field.
Produced	A flag indicating whether this substance is produced. Allowable values for this field are: Y (this substance is produced), N (this substance is not produced). Press the button labeled ***Produced*** to change the value of this field.
Present	A flag indicating whether this substance is present. Allowable values for this field are: Y (this substance is present), N (this substance is not present). Press the button labeled ***Present*** to change the value of this field.
How Present	A description of how the chemical is present at this facility. This can be any string up to 39 characters.

5.14.2 Adding a Supplemental Record

To add a new supplemental record to the database, select ***Add*** from the menu of the supplemental data window. The following dialog box will appear.



In order to add a supplemental record you must provide a new pollutant ID. Pollutant IDs are either the CAS numbers or SAROAD codes. The pollutant ID must be a valid ID that exists in the pollutant table. If you do not know the pollutant ID, press the ***Pollutant ID*** button to select one from a list.

When you have entered the new pollutant ID, press ***OK***. HARP will then validate your entry. You can only exit this dialog window by providing a valid pollutant ID or by pressing the ***Cancel*** button.

5.15 Areawide Sources

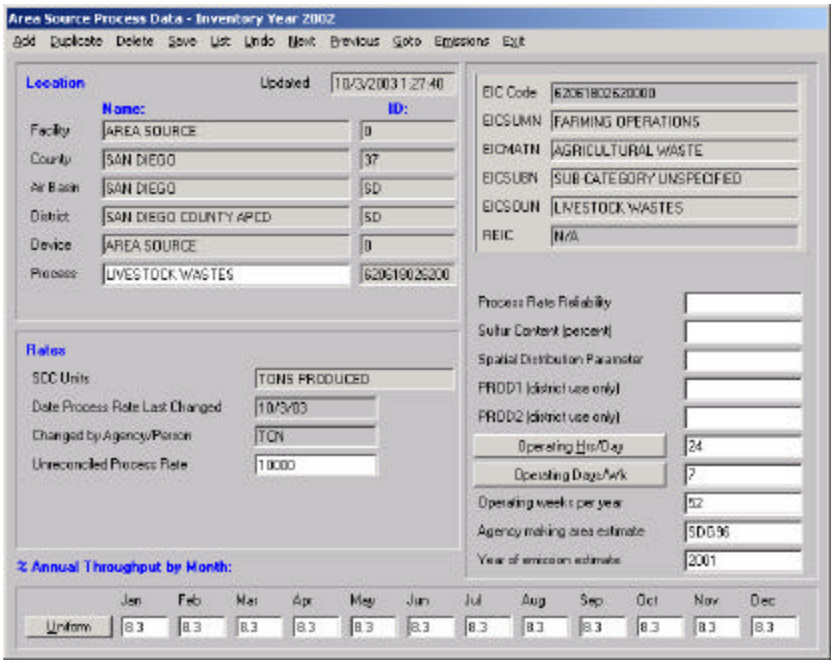
Areawide source data is edited by selecting ***Edit Data/Areawide (Regional) Sources*** from the main menu. When you do this, HARP will take you directly to the process data window.

Internally, all process and emissions records for areawide sources are associated with a specific COABDIS (County, Air Basin, District), a fictitious facility, whose ID is 0, and a fictitious device, whose ID is also 0. The process ID for an areawide source must always be a valid EIC code from the EIC table. In all other respects, editing of areawide sources is the same as editing stationary point sources.

Note: Areawide sources should already have been populated with previous emission inventory data. You cannot add an areawide source category. Contact the ARB for assistance if you need to create an EIC.

5.15.1 Editing an Areawide Source Process

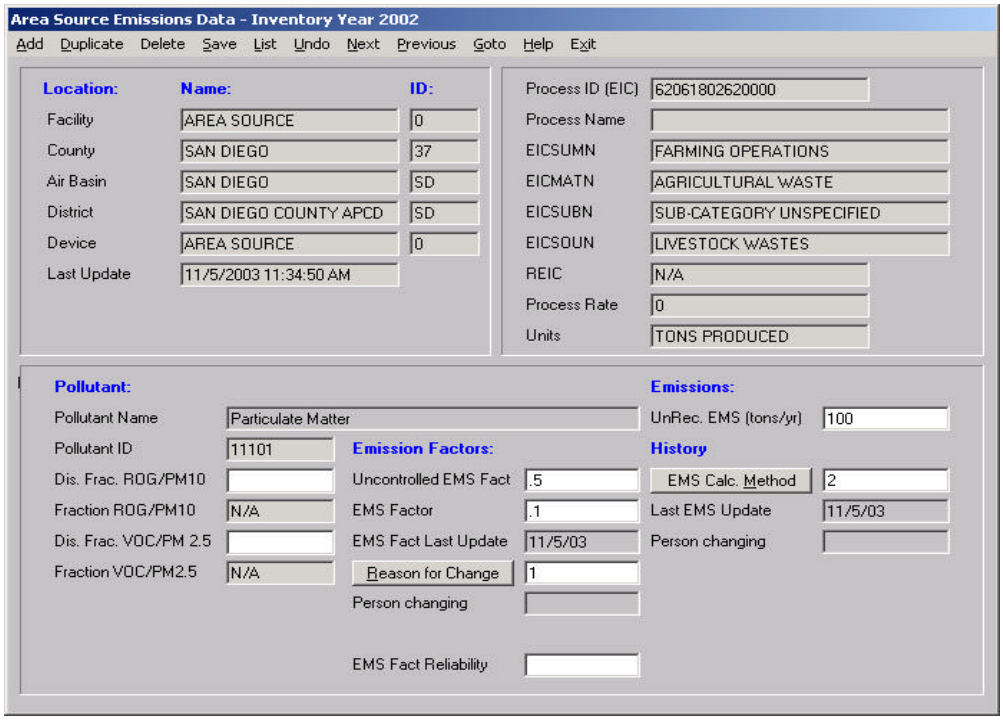
As mentioned previously, emission inventory codes (EICs) are pre-assigned by the ARB. Process and emissions data can only be changed or updated and not added. If you need to create or add an EIC, consult the ARB for assistance. To edit an existing EIC, select ***Edit Data/Areawide (Regional) Sources*** from the main menu. Click ***List*** and select a process ID for edit. An example of a process data window for areawide source is shown below.



Change the *Unreconciled Process Rate* and any temporal parameters such as *Operating Hour per Day* and *Operating Days per Week*. ***Be sure to specify the agency making the estimate.*** This information is needed to track any changes in the emissions for a specific EIC. Refer to section 5.13 to edit the emissions data.

5.15.2 Editing an Areawide Source Record

From the Area Source Process Data window and after entering appropriate process data, click the ***Emissions*** option in the Windows menu to access the emission data window. An example of the areawide source emission data is shown below:



Note that only unreconciled emissions are needed. The ARB will reconcile emissions from this areawide source against its corresponding stationary point sources category. Once the data is entered, click save and exit.

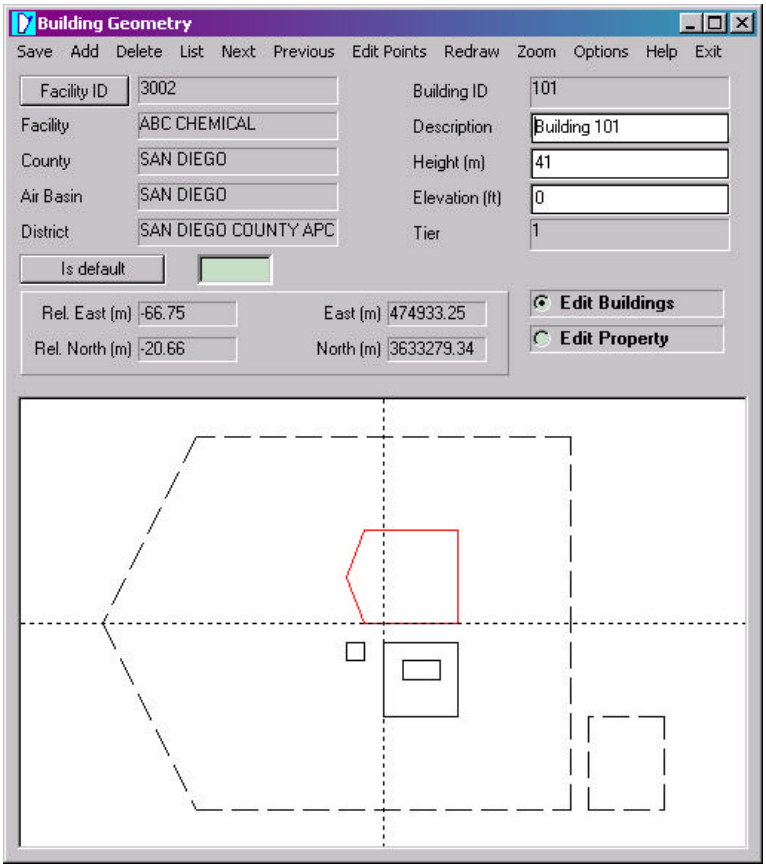
5.16 Building Geometry Data Window

Building geometry is used for building downwash calculations when setting up a dispersion analysis. If you do not enter building geometry, then no downwash calculations will be included.

Each facility may have one or more buildings. Each building may have one or more tiers. The use of tiers allows buildings to be described as multiple levels. Typically one tier will be stacked atop another to describe a stepped-in geometry.

Each tier of each building is described by three or more vertex points, which represent the corners of the building, and a tier height. The tier height is measured from the building base elevation, which is the same for all tiers of a particular building.

To edit building data for a facility, select ***Geometry/Building*** from the menu on the *Facility Data* window. The *Building Geometry* window will appear similar to that shown below. Each solid shape on the drawing represents a single tier of one of the buildings. Use the navigation options on the menu to select the current building tier to be edited. To add a building to this facility, select *Add*. To delete the currently selected building, select *Delete.*



To edit the individual points of the current building, select *Edit Points.* This will display the *Building Boundary Points* window as shown below. From this window you can add or delete vertex points for a tier or change the coordinates of the points.

For a detailed example of editing building geometry, refer to the tutorial in section 4.4.6.

5.17 Property Boundary Data Window

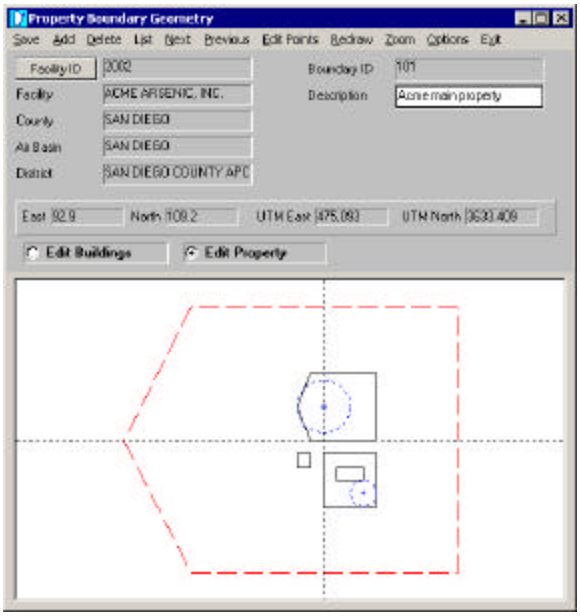
Property boundary data is used to locate boundary receptors for risk analysis. Because the MEI (maximum exposed individual) is often located on or near a property boundary, the normal practice is to place receptors along the property boundary at intervals. This must be done prior to running the dispersion analysis. Once the property boundaries have been identified HARP can be used to generate receptors at regular intervals along the boundary automatically so that you do not have to figure out the UTM coordinates of each boundary receptor.

Each facility may have one or more property boundaries. The boundary curves do not have to be connected. This could be used, for example, to describe a facility having properties on opposite sides of a street.

Each property boundary curve is described by three or more vertex points, which represent the corners of the property line.

Each vertex is described by its easterly and northerly coordinates, measured relative to the facility location. The facility location for ABC Chemical is UTM coordinates 475 meters east and 3633000 meters north as entered on the *Facility Data* window. After entering the building and property boundary coordinates, you may shift the location of all buildings and property points by adjusting the facility location only.

To edit property boundary data for a facility, select *Geometry/Property Boundaries* from the menu on the *Facility Data* window. The *Property Boundary Geometry* window will appear similar to that shown below. Each dotted line closed shape on the drawing represents a single property boundary line for this facility. Use the navigation options on the menu to select the current building tier to be edited. To add a building to this facility, select *Add.* To delete the currently selected building, select *Delete.*



To edit the individual points of the current property boundary, select ***Edit Points***. This will display the ***Property Boundary Points*** window as shown below. From this window you can add or delete vertex points for a property boundary or change the coordinates of the points.

For a detailed example of editing property boundary geometry, refer to the tutorial in section 4.4.7.

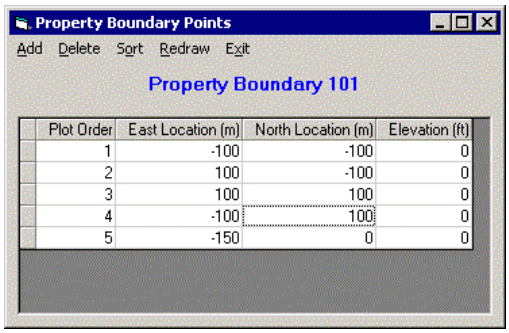
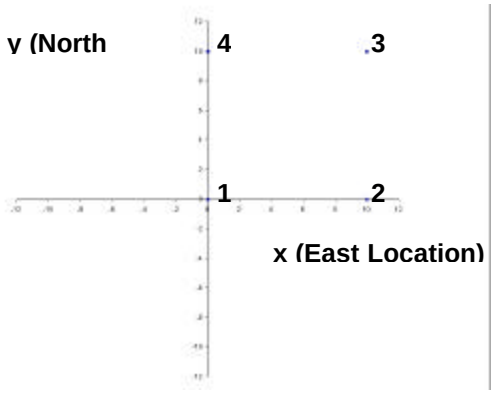


Illustration of Property Boundary Points

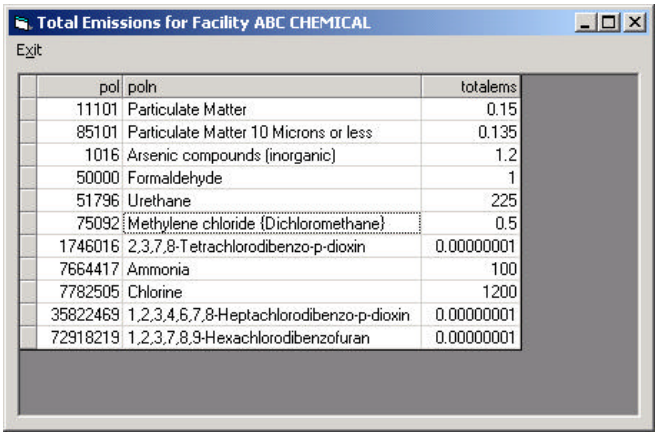


5.18 Calculate Facility Priority

HARP performs the prioritization calculations in accordance with the guidelines set forth by the California Air Pollution Control Officers Association in the document entitled *CAPCOA Air Toxics "Hot Spots" Program Facility Prioritization Guidelines (July 1990)*. This software application is intended for District use. For details on prioritization calculations please see Chapter 8.

5.19 Calculate Facility Total Emissions

From the facility-editing window you can display a summary of total facility emissions by selecting the ***Calculate/Total Emissions*** menu option. HARP will then display a list of all of the pollutants emitted by the facility and their annual emissions (lbs/yr), as shown in the following example. The pollutants are ordered alphabetically, except that the criteria pollutants always appear at the top of the list.



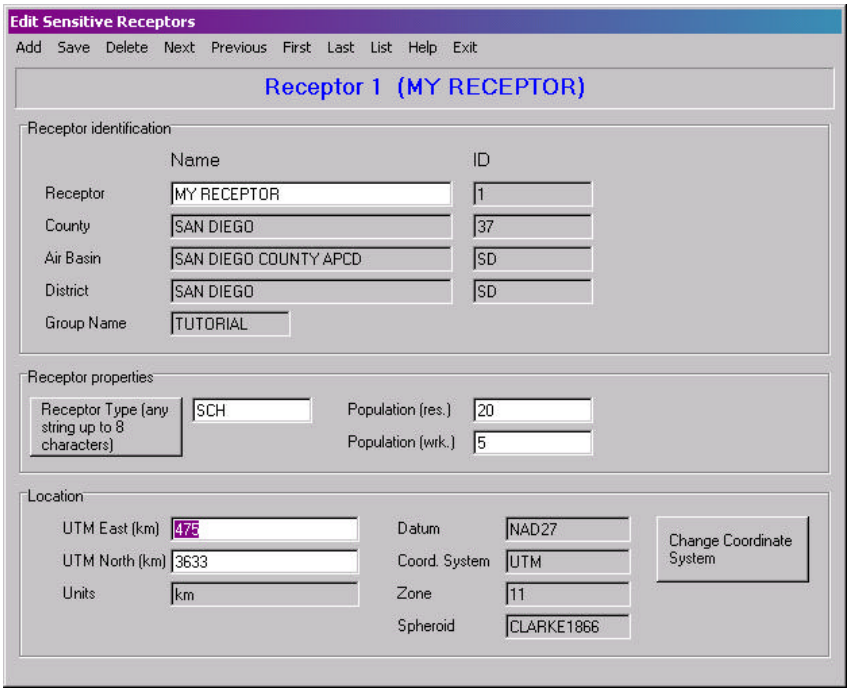
pol	poln	totalems
11101	Particulate Matter	0.15
85101	Particulate Matter 10 Microns or less	0.135
1016	Arsenic compounds (inorganic)	1.2
50000	Formaldehyde	1
51796	Urethane	225
75092	Methylene chloride (Dichloromethane)	0.5
1746016	2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.00000001
7664417	Ammonia	100
7782505	Chlorine	1200
35822469	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.00000001
72918219	1,2,3,7,8,9-Hexachlorodibenzofuran	0.00000001

5.20 Sensitive Receptors

Sensitive receptor data is edited in the sensitive receptor-editing window, which is accessed by selecting ***Edit Data/Sensitive Receptors*** from the main menu. For each sensitive receptor, you are required to provide the location (UTM coordinates) and the residential and working populations. Sensitive receptor data is used in the prioritization calculations and the risk assessment modules.

When you add a new receptor by selecting the ***Add*** menu option, you will be prompted for a COABDIS (County, Air Basin, District) and a new receptor ID. IDs must be unique within each COABDIS.

For a detailed tutorial on editing sensitive receptor data, refer to section 4.4.8.

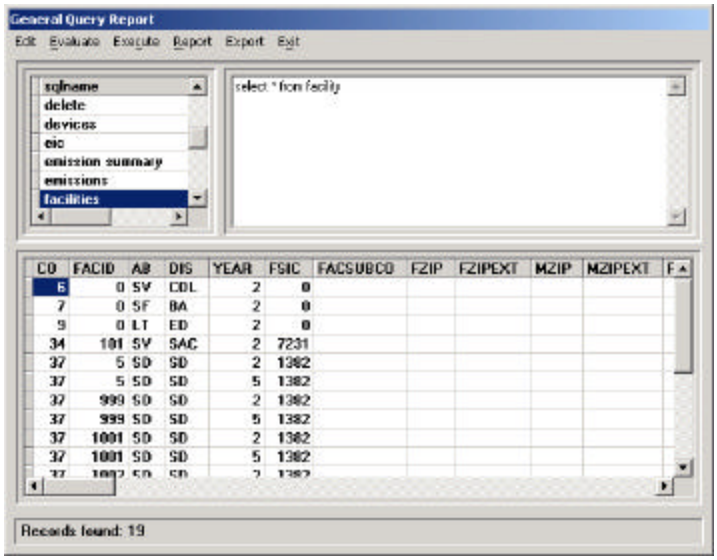


5.21 General Query

The general query report is used to search the database in arbitrary ways, to generate reports, and to export data from any of the HARP tables to an ASCII.5 file in either comma-delimited or tab delimited format.

Using the general query function requires some knowledge of Structured Query Language (SQL). If you are unfamiliar with SQL, a good place to start is the on-line help for Microsoft Access. There are also numerous reference books published on SQL for all levels of experience. The advantages of using SQL are that it is a standard language that is common to almost all databases, and it is completely general. With SQL it is possible to retrieve any data in the database with a single line query. In most cases the query expression will be fairly short.

The following figure shows the general query report window. The remainder of this section describes how to use it.



The general query window contains three sub-windows: 1) the upper left sub-window is a list of saved queries; 2) the upper right window contains the editable text of the currently selected query; 3) the lower window contains the results of evaluating a query.

You may create a query to generate a report, then save this query in the database so that you can produce the same report in the future without retyping the query. Each saved query is given a name when it is saved. The names of all saved queries are listed in the upper left sub-window. To recall a query, simply click on its name in the list. The text of the query will then appear in the edit window in the upper left corner. Any changes that you make to the query are automatically saved when you move to another query or exit the window. To display the results of a query, select the ***Evaluate*** menu option.

Queries must refer to fields and tables in the database. Appendix C contains a description of the most commonly used tables and fields.

The following is a list of the menu options for this window and their functions.

Edit/New This menu option creates a new query in the database. You will be prompted for the name of the query, and the edit window will be cleared.

Edit/Save This menu option will cause changes to the current query to be saved immediately. Changes are also saved when you move to a different query or exit the general query window.

Edit/Delete This will cause the current query to be deleted from the database.

Evaluate This will cause the displayed query to be evaluated, and the results to be displayed in the lower portion of the window.

Report/Build Report This causes the current query to be evaluated, and the results to written to a tab-delimited text file named TABBED.TXT, located in the same directory as HARP. The file is then displayed in a print preview window from which it can be printed.

Report/ View Last Report	This causes the most recent report generated with the Report/Build Report menu option, to be displayed in a print preview window from which it can be printed.
Export/ Export to CSV File	This causes the displayed query to be evaluated and the results to be exported to a comma-delimited text file (CSV stands for "comma separated variables"). CSV files can be imported into most spreadsheet programs.
Export/ Export to Tabbed File	This causes the displayed query to be evaluated and the results to be exported to a tab-delimited text file. Tab-delimited files can be imported into most spreadsheet programs.

5.22 Update Fixed Tables

This utility is used to update certain "fixed" tables in the database with new data provided by ARB. From time to time, ARB may revise certain tables containing fixed codes, for example, the SIC and SCC tables. When this happens, an update will be published by ARB on their web site http://www.arb.ca.gov/. To update your HARP database with this new information, first download the file. Then select ***Utilities/Update Fixed Tables*** from the HARP menu. You will be prompted for the name of the update file, HARP will then proceed to read the file and update your HARP database. If you have more than one HARP database file, then you should update each of them.

5.23 Upgrades

The information in the following sections applies to users of CEIDARS-Lite. CEIDARS-Lite is the emissions inventory module of HARP and was released previously to the full version of the HARP software. For more information on CEIDARS-Lite see section 5.2.

5.23.1 Compatibility With Previous Versions

The structure of the HARP database changed substantially in version 14.08, and again in version 21.01. The changes in version 21.01 were done for compatibility with the new CEIDARS 2.5 database that is now used by ARB. HARP provides a way to easily convert your old database to the new structure. This conversion works for all versions of HARP back to version 11.10. You must do this conversion in order for the new features of HARP to work. Failure to convert you database may cause the program to fail at various points.

5.23.2 Converting The HARP Database From An Older Version

This section describes what you should do if you are installing HARP on a machine where you have an earlier version of HARP already installed. If you have never installed HARP before, then you can skip this section.

When you run the new version of HARP, you should first check the name of the database file that is opened (select Help/Database Info from the menu). Depending on which version of

HARP you had previously installed, HARP may open your old database file or it may open the new file called HARP.MDB.

If your old database file is not opened, then you should open it by selecting ***File/Open Database*** from the menu. HARP will prompt you with a reminder that the database format is outdated.

You should immediately select ***Utilities/Upgrades/Upgrade Database*** from the menu. HARP will then convert your database to the new file, and tell you when it is done. You must then open the new database file in order to use it. The name of the new database file will be the same as your previous database file, except it will have "_2103" appended to the name (which just indicates that the new database format is compatible with HARP version 21.03 and later). You may, if you wish, use Windows Explorer to first rename the file to something that is easy for you to remember. To open the new database file after conversion, select ***File/Open Database*** from the menu.

One of the changes that occurred between version 11.10 and version 14.03 was that building and property data in the later versions is segregated by year. Because of this, if you are upgrading from a version of HARP prior to version 14.03, you must perform one more step to recover building and property data (if you have entered any). If you have not previously entered building and property data, then you may skip the rest of this section.

All building and property data that was in your old database will be stored under year zero in the new database. Because the previous version of the database did not identify building and property data with any particular year, there is no way for HARP to know where to put it, so year zero is chosen arbitrarily.

First use the ***Multiyear*** window to change to the reporting year where your data is stored. Then select ***Utilities/Upgrades/Duplicate Building and Property Data*** from the menu. When prompted, enter 0 (zero) for the source year, and enter the current year for the target year. All building and property data will then be copied from the year zero (which came from the previous database) to the current year.

You should repeat this procedure if your old database contained data for multiple reporting years. In other words, for each year for which you have emissions data, first use the ***Multiyear*** window to change to that reporting year, and then copy the building and property data from year zero to that year.

5.23.3 Updating Fixed Tables

You only need to do this step if you are upgrading from a previous version of the HARP program. Check the name of the update file that is on the CD (or the name of the file that you downloaded). If you have already applied this update file to your current database, then you do not need to repeat the process. If you are in doubt, it does not harp to apply an update more than once.

The fixed tables in the HARP database contain data provided by ARB, such as SCC and SIC codes and pollutant IDs. If you are upgrading from a previous version of HARP, the following procedure will update the fixed tables in your database with the most recent data provided by CARB

1. Run HARP by clicking on the HARP icon on your Windows desktop.
2. From the main menu, select Utilities/Update Fixed Tables
3. When prompted for a files name, select the file that is located in the HARP\TableUpdates directory on the CD. (If you have downloaded the table update file, select the file from wherever you placed it on your had disk.)
4. You will be prompted with the question: "do you want to make a backup of your database". I recommend answering Yes. You can always return to the backup copy later it you need to. The backup copy is rather large though, so you can skip this if you are short of disk space.
5. Click OK. The update will proceed and you will be told when it is done.

Chapter 6 Table of Contents

6. Emission Inventory Reports

6.1 Reports

Reports are accessed by selecting ***Reports*** from the main menu. The "Inventory Reporting Forms" selection allows users to print the emission inventory data in the "Turn-Around-Document" format. This is a pre-electronic age format where data are manually filled in pre-written forms and then submitted to the ARB for entering to CEIDARS. ARB is no longer accepting these forms; however, users can print these forms for record keeping and documentation if they wish. The "Emission Summaries" allows users to print summaries of emissions by facility or by process. QA reports allow users to perform QA on facilities in the database. QA can either be performed on a set of facilities or on the entire district. To compare emissions data from two different years, users can select the "Compare Two Years" option. This report is a valuable tool to track changes in emissions for the same facility. The following sections describe each type of report and how to access them through ***Reports*** menu option. In each option, there are common functions such as ***List Selection*** and ***List Editor***. These functions will be addressed before discussing the details of how to run a report.

6.2 List Selection

There are numerous places in the program where you may select an item from a list rather than entering text from the keyboard. For example, each of the data editing windows has a ***List*** option in the menu that allows you to select from a list of available records. Also, the data editing windows all contain buttons displayed next to certain data entry fields. Most of these buttons cause the program to display a list of possible values for that data field. This section describes how to use the list selection window.

You can select from the displayed list in one of two ways:

1) When the list is displayed, double-click on the record you wish to view;
2) Use the up and down arrow keys to move the highlight to the record you wish to view, then press the ***Enter*** key

If the list is large you may want to narrow it down by applying a search filter. A search filter is a string that the program uses to search for records to be displayed. Only records that contain the search string within certain key fields are displayed. To apply a filter, move the cursor to the field next to the button labeled "Search String". Enter the string that you wish to search for and then press the button. To cancel the search and once again display all fields, delete the search string and press the button again.

The steps described above can be done without using the mouse. Simply use the *Tab* key to move the cursor back and forth between the scrolling list of records and the search string field. Use the *Alt-S* key combination to activate the search and the left and right arrow keys, backspace key and delete key to edit the search string.

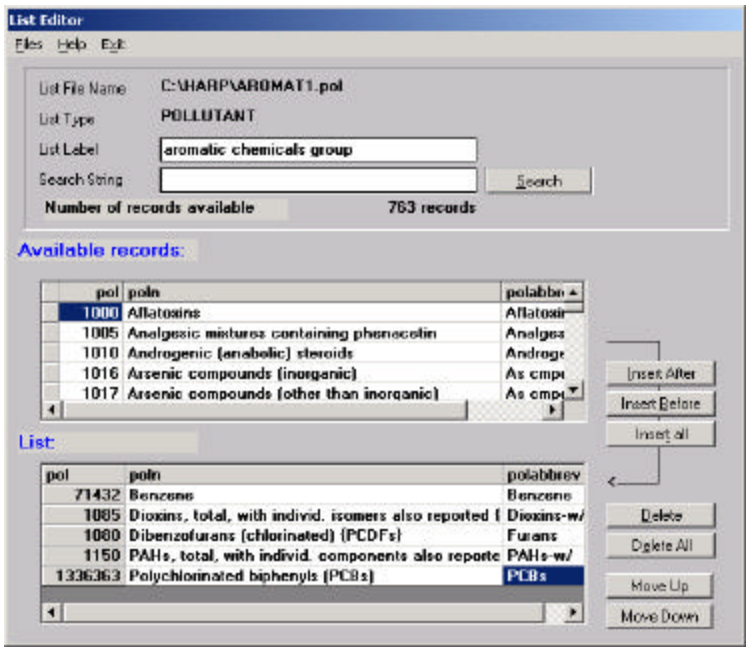
To cancel the list selection, either press the ***Cancel*** button with the mouse or press the ESC key.

6.3 List Editor

The List Editor allows you build a list of records from the database that you can save to a file and recall later. Lists are used for various analysis and reporting functions. For example, you might want to generate a report that contains emission data for a number of chemicals that you specify and from a list of facilities. The list editor allows you to specify the list of chemicals or a list of facilities and save the lists to files. If you want to generate the same report at a later time you need only recall the lists. The program uses two types of editable lists: pollutant and facility lists. These are described in the following two sections.

6.3.1 Editing a Pollutant List

The window shown below displays a list of chemicals taken from the pollutant table. This list can be activated from several of the report windows to allow you to specify which pollutants you want reported.



The name of the file containing the list is shown at the top of the window. For this example, the file is pre-determined and contains a set of aromatic substances. The next item shows the type of list, which is determined by the program. The user can change the **List Label** field, which is simply a text description of the list.

The scrolling window just below the **Available Records** label contains all of the chemicals in the database. The scrolling window at the bottom of the window shows the chemicals contained in the list that you are editing. The buttons on the right of the window

provide various functions for adding or deleting items from the list being edited, as described below.

To add a record to the list, first click on the bottom list to select the item place in the list where you want to insert the new item. Then select one of the items in the top list that you want to add. Then select one of the following three buttons.

Insert After	inserts the selected record from the top list immediately after the selected record in the bottom list
Insert Before	inserts the selected record from the top list immediately before the selected record in the bottom list
Insert All	inserts all records from the top list into the bottom list

To delete an item from the list, first click on the item that you want to delete. Then press one of the following two buttons:

Delete	deletes the selected record from the list
Delete All	deletes all records from the bottom list

After making changes to the list you should select on of the following menu items:

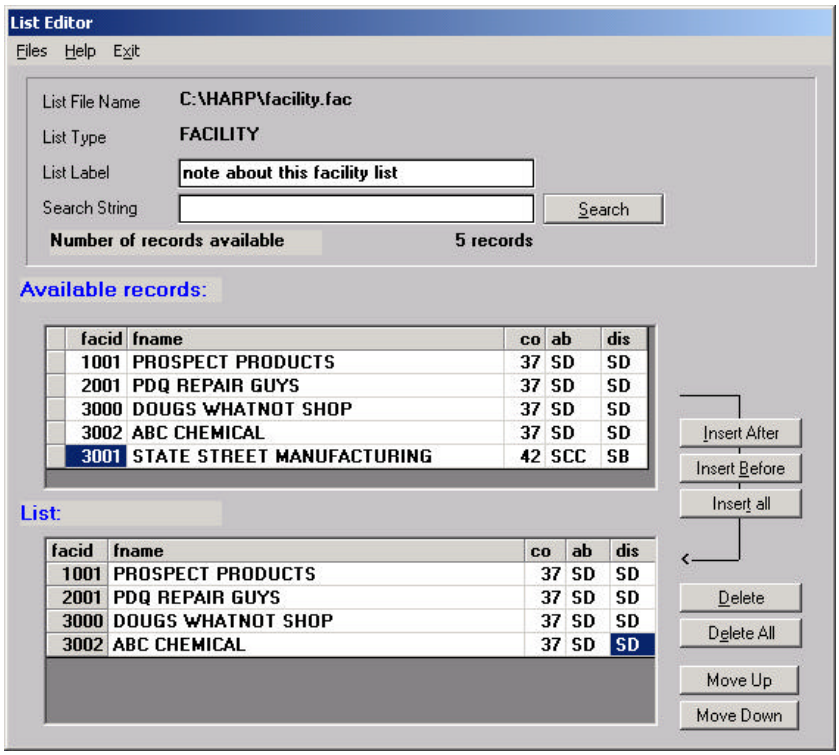
File/Save	saves the list to the file named at the top of the window
File/Save As	saves the list to a new file for which you will name

To edit an existing list, select ***Files/Open*** from the menu. Then locate the list file in the file selection dialog box.

To create a new list, select ***Files/New*** from the menu. Users can also create a new list by pressing the ***Delete All*** button and then saving the list to a new file with the ***File/Save*** menu option.

6.3.2 Editing a Facility List

The window shown below displays a list of facilities taken from the facility table. This list can be activated from several of the report windows to allow you to specify which facilities you want reported.



The name of the file containing the list is shown at the top of the window. In this example, file *facility.doc* contains a list of facilities. The next item is the type of list, which is determined by the program. The user can change the **List Label** field, which is simply a text description of the list.

The scrolling window just below the **Available Records** label contains all of the facilities in the database. The scrolling window at the bottom of the window shows the facilities contained in the list that you are editing. The buttons on the right of the window provide various functions for adding or deleting items from the list being edited, as described below.

To add a record to the list, first click on the bottom list to select the place where you want to insert the new item. Then select one of the items in the top list that you want to add. Then select one of the following three buttons.

Insert After inserts the selected record from the top list immediately after the selected record in the bottom list

Insert Before inserts the selected record from the top list immediately before the selected record in the bottom list

Insert All inserts all records from the top list into the bottom list

To delete an item from the bottom list, click on the item that you want to delete and press one of the following three buttons:

Delete deletes the selected record from the list

Delete All deletes all records from the bottom list

After making changes to the list you should select one of the following menu items:

File/Save saves the list to the file named at the top of the window
File/Save As saves the list to a new file that you will name

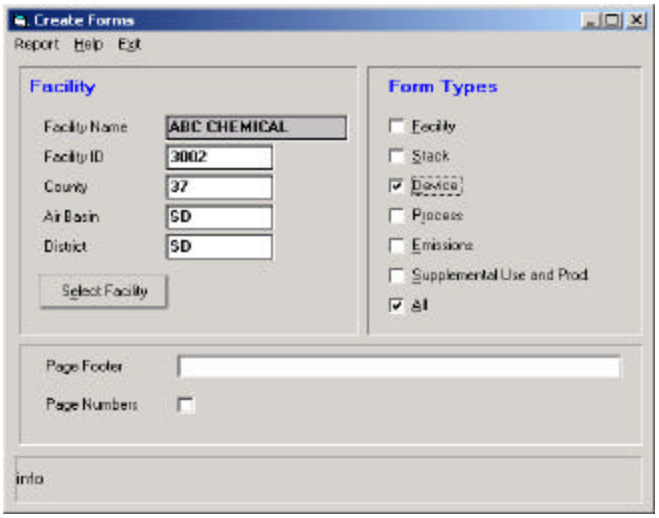
To edit an existing list, select ***Files/Open*** from the menu. Then locate the list file in the file selection dialog box.

To create a new list, select ***Files/New*** from the menu. Users can also create a new list by pressing the ***Delete All*** button and then saving the list to a new file with the ***File/Save*** menu option.

6.4 Inventory Reporting Forms

Inventory reporting forms are hard copy forms that the facilities may use for documentation purposes only. HARP can generate a complete set of inventory reporting forms for a facility. These forms will include data taken from the database for the current reporting year, or any other reporting year that you select (to learn about editing data from previous reporting years refer to section 5.3).

To create a form, click on *Reports/Inventory Reporting Forms* from the HARP main screen. The *Create Forms* window will be displayed. There are four types of forms: Facility Form, Stack Form, Device Form, and Process Form. The process form also includes both process and emissions.

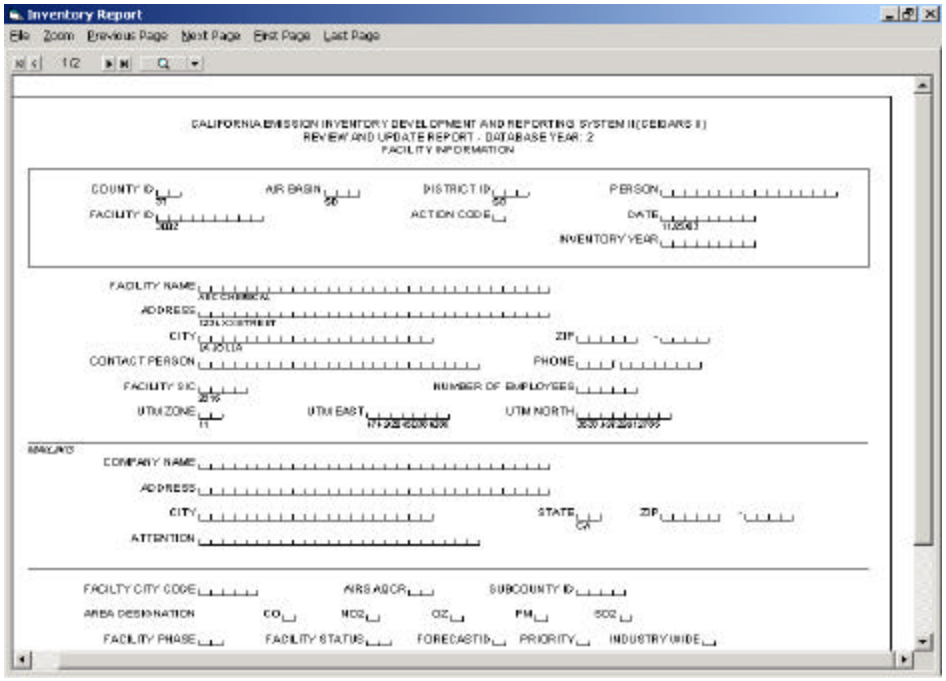


Start by selecting which of these four types of forms you wish to create by selecting one or more of the check boxes on the right side of the window. Next select the facility by either entering the ID in the fields on the left side of the window or pressing the ***Select Facility*** button to select a facility from a list.

To create the report, select one of the following menu options.

Print/Preview	This causes the selected reports to be created and displayed in a preview window. From the preview window the report can be printed.
Print/To Printer	This causes the report to be created and sent directly to the printer.
Print/Print Last Report	This causes the last report that you created to be recalled and sent directly to the printer.
Print/Preview Last Report	This causes the last report that you created to be recalled and displayed in the preview window.

The preview window for the inventory reporting forms appears as shown below. The bottom line of the window shows how many pages are in the report. The menu options may be used to display the Next, Previous, First or Last pages of the report. While this window is displayed, the report may be sent to the printer by selecting ***Print/Current Page*** or ***Print/All Pages*** from the menu. The example below shows only the first page, which is the facility reporting form.



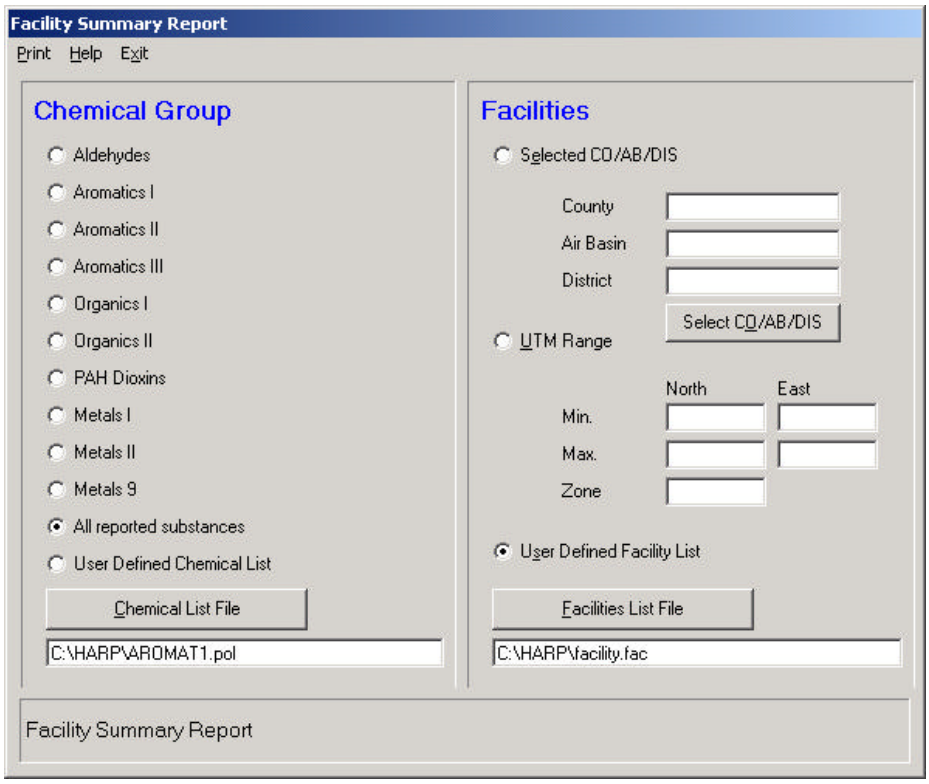
6.5 Emissions Summary Reports

The emissions summary reports are accessed by selecting ***Report/Emission Summaries*** from the main menu. There are two types of emission summary reports, which are described in the following sections.

6.5.1 Emission Summary by Facility

This feature is accessed by selecting ***Reports/Emission Summaries/By Facility*** from the main menu. The dialog window shown below will then appear.

You must pick one of several pre-defined groups of substances by selecting one of the circular radio buttons on the left. A definition of each chemical group can be found in Appendix E. You may also select ***All Reported Substances*** or ***User Defined List***. If you select ***User Defined List***, the name of the list file must be entered into the box at the bottom left of the window. To edit the list or open a different list file, click on the button labeled ***Chemical Group List File***. This will call up the list editor, which will allow you to build your own list of chemicals from the database. For details on using the list editor refer to section 6.3.



After specifying which chemicals you want reported, you must specify which facilities to include by making a selection on the right side of the window. If you choose ***Selected CO/AB/DIS***, then you must enter a valid County, Air Basin and District ID combination in the boxes on the right. You may also select a COABDIS from a list of those available by pressing the button labeled ***Select CO/AB/DIS***.

If you choose UTM Range, you must specify a range of UTM coordinates on the text boxes on the right side of the window. The program will then generate a report, which includes all facilities whose location falls within those UTM coordinate boundaries. The report will not

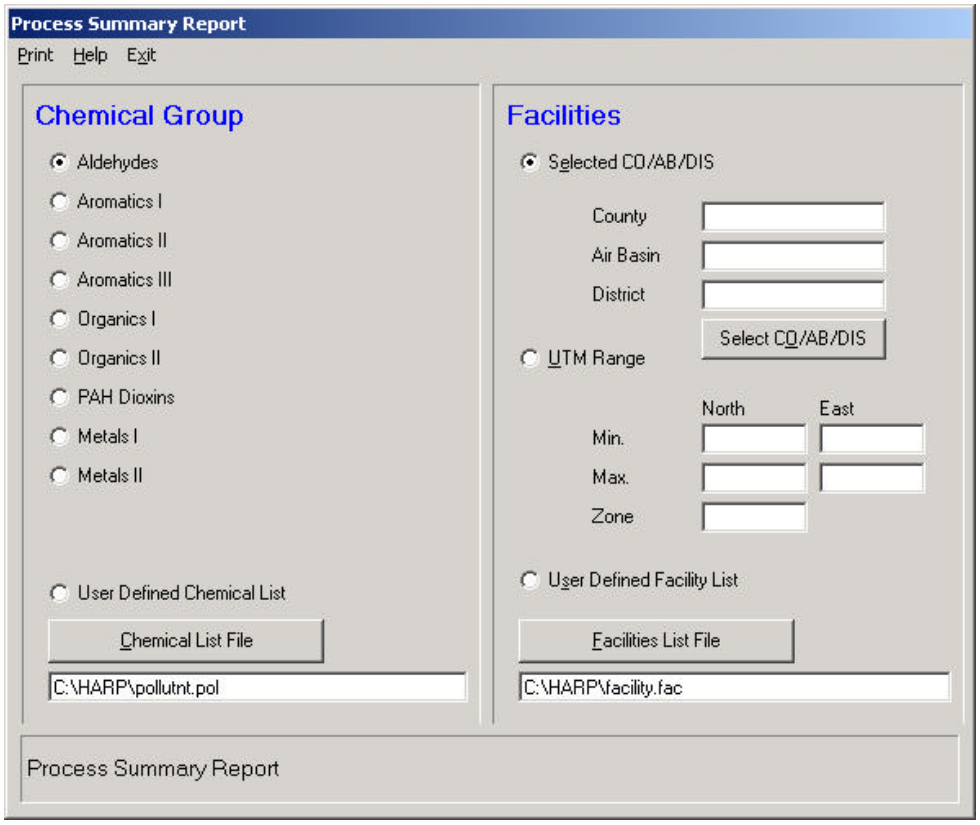
include any facilities for which UTM coordinates have not been entered on the facility-editing window (for details on editing facility data refer to section 4.4).

If you select User Defined Facility List, then you must enter the name of a facility list file in the text box in the lower right corner of the window. To edit a list of facilities or open a new list, press the button labeled ***Facilities List File***. This will call up the list editor, which will allow you to build your own list of facilities from the database. For details on using the list editor refer to section 6.3.

After specifying the chemicals and the facilities you want to report, you can preview it, send it to a printer or to a file. If you send it to a printer, make sure your computer is connected to the printer. If you send it to a file for later retrieval, please open the file using Microsoft Word (or other word processor) with the following settings: font – courier new, 8 point, paper size – landscape.

6.5.2 Emission Summary by Process

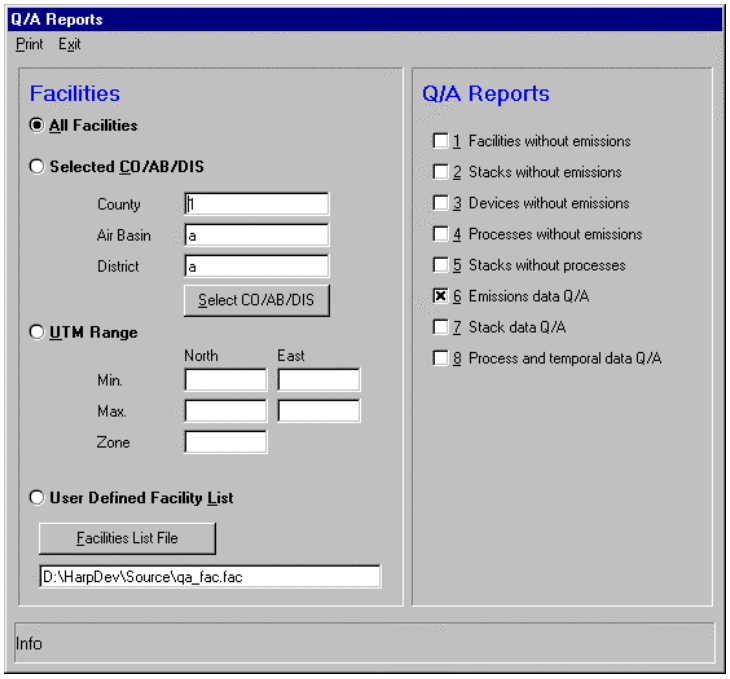
This report is accessed by selecting ***Reports/Emission Summaries/By Process*** from the main menu. The dialog window shown below will then appear. This is the same as the window for the Emission Summary by Facility report, except that a different set of chemical group options is available. To create and print a report, follow the same procedures described in section 6.5.1, Emission Summary by Facility.



6.6 Q/A Reports

The Q/A reports are intended to provide various checks on the consistency and completeness of the data contained in the database. To access this feature, select ***Reports/QA*** menu from the main window. The remainder of this section describes how to create these reports.

First specify which facilities you want to report by selecting one of the circular radio buttons on the left side of the window. If you select ***Selected CO/AB/DIS***, then you must specify the County, Air Basin and District IDs in the text boxes on the left. Alternatively, you may select a COABDIS from a list by pressing the button labeled ***Select CO/AB/DIS***.



If you choose ***UTM Range***, then you must specify a range of UTM coordinates on the text boxes on the left side of the window. The program will then generate a report which includes all facilities whose location falls within those UTM coordinate boundaries. The report will not include any facilities for which UTM coordinates have not been entered on the facility-editing window (for details on editing facility data refer to section 4.4).

If you select ***User Defined Facility List***, you must enter the name of a facility list file in the text box in the lower right corner of the window. To edit a list of facilities or open a new list, press the button labeled ***Facilities List File***. This will call up the list editor, which will allow you to build your own list of facilities from the database. For details on using the list editor refer to section 6.3.

Finally, you should select one or more of the eight report types shown on the right side of the window by checking the corresponding boxes.

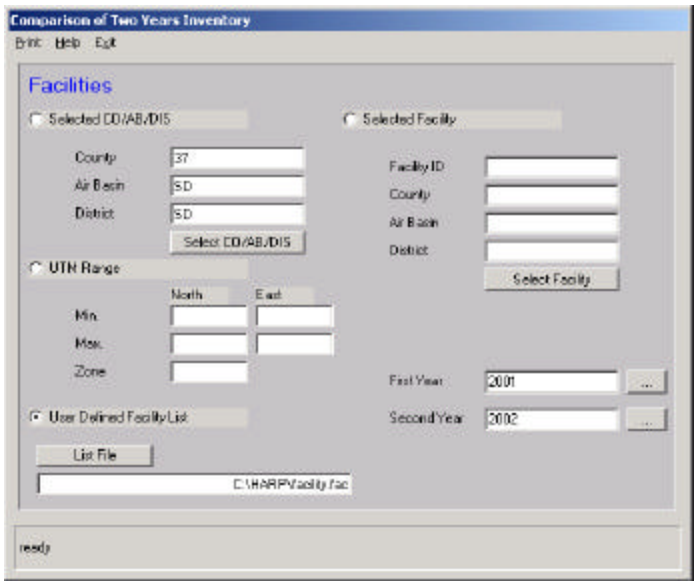
To actually generate the report, select one of these options under the ***Print*** menu:

Print/Preview	This will create the reports and display them in a preview window.
Print/To Printer	This will create the reports and send them directly to the printer.
Print/To File	This will create the reports and send them to a file.

6.7 Compare Two Years Report

This report is used to compare emissions from two different reporting years for one or more facilities. In order for this report to work, the database must contain data for the same facilities for two inventory-reporting years. For a description of how to specify inventory-reporting years and edit data from different years refer to section 5.3.

To access this feature, select ***Reports/Compare Two Years*** menu from the main window. This will cause the following dialog window to be displayed. The remainder of this section describes how to create this report.



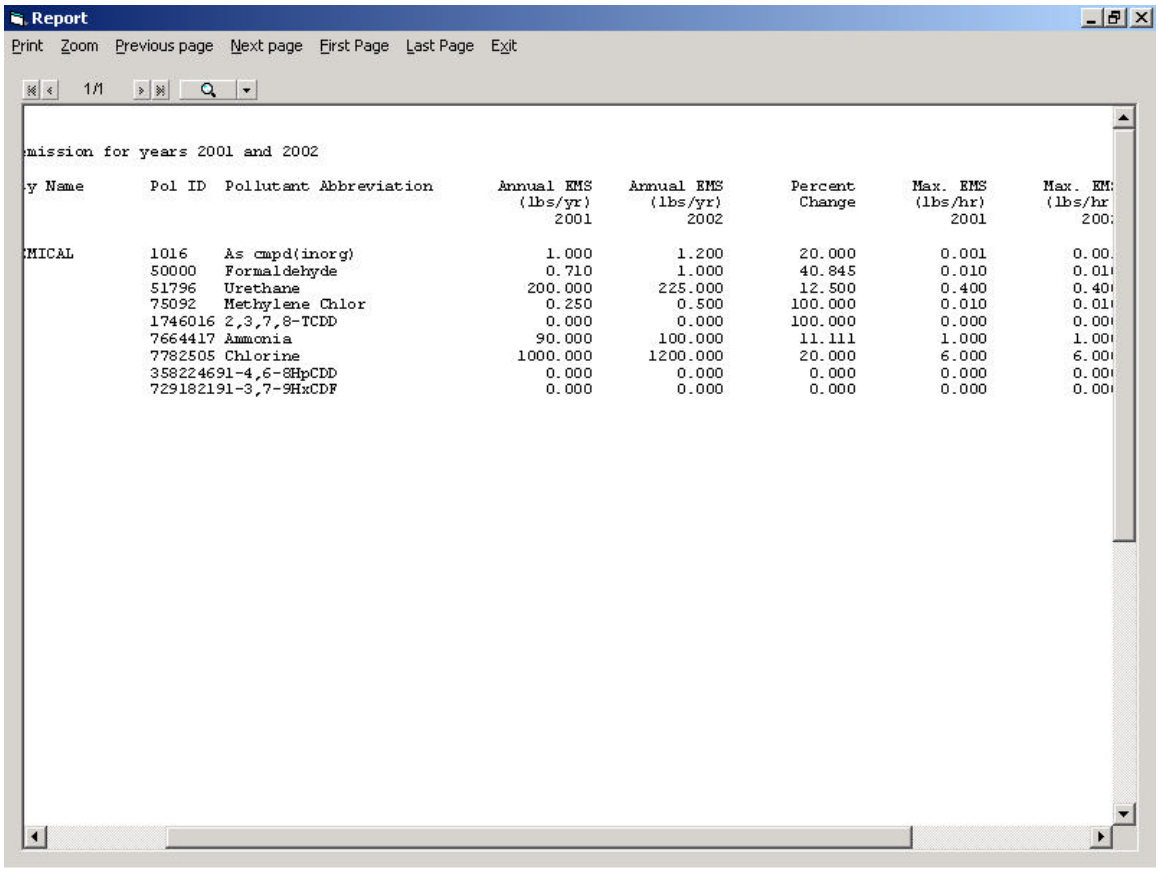
You must specify which facility to include in the comparison by making a selection on the right side of the window. You can supply the ID for the facility or click on the "Select Facility" button and then select it from the available records. If you choose ***Selected CO/AB/DIS***, then you must enter a valid County, Air Basin and District ID combination in the boxes on the right. You may also select a COABDIS from a list of those available by pressing the button labeled ***Select CO/AB/DIS***.

If you choose UTM Range, then you must specify a range of UTM coordinates on the text boxes on the right side of the window. The program will then generate a report, which includes all facilities whose location falls within those UTM coordinate boundaries. The report

will not include any facilities for which UTM coordinates have not been entered on the facility-editing window (for details on editing facility data refer to section 4.4).

If you select *User Defined Facility List*, then you must enter the name of a facility list file in the text box in the lower right corner of the window. To edit a list of facilities or open a new list, press the button labeled ***Facilities List File***. This will call up the list editor, which will allow you to build your own list of facilities from the database. For details on using the list editor refer to section 6.3.

Enter the first and second years on the bottom right windows and then select Print to either view or send a report to the printer. A sample report is shown below:



Chapter 7 Table of Contents

7. Transactions

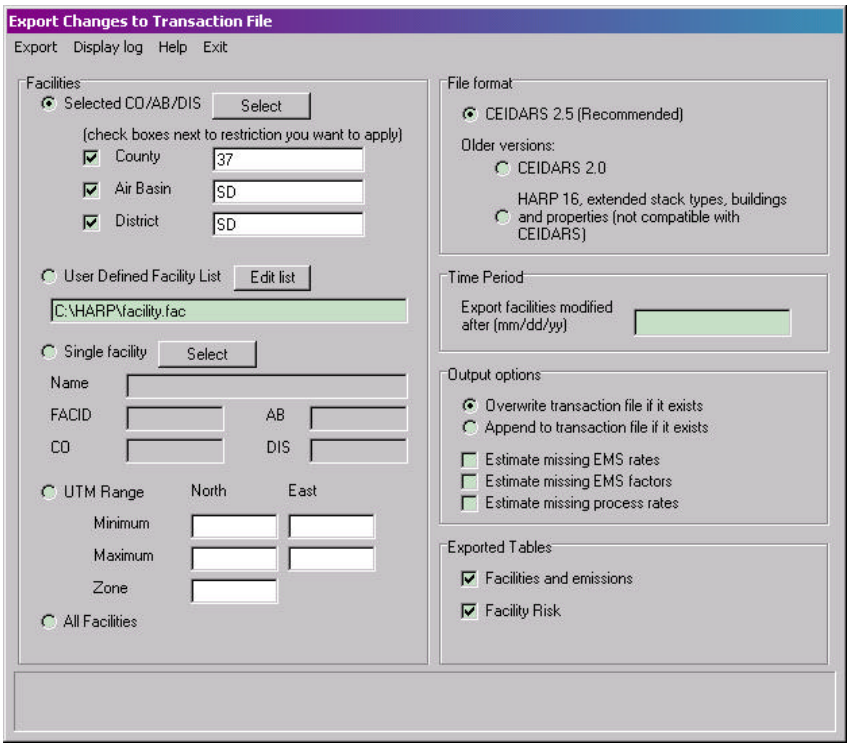
Transaction files are text files containing data that is being transferred from one database to another. The intent is that these files will primarily be used to transmit data from air pollution control districts to the CEIDARS database, as well as from the ARB database to the districts. The latter function should be useful for districts that want to initialize their HARP database with historical data given to them by ARB. The mechanism for actually transmitting the transaction files is expected to be either by e-mail, or on floppy disk through regular mail.

HARP provides a simple way to create (export) and read (import) transaction files. To access this feature, select the following options: ***Transactions/Export Facility and Emissions***, ***Transactions/Export Receptors, Transactions/Import Receptors,*** or ***Transactions/Import Facility and Emissions*** from the main menu. The following sections describe each process and how/when to use it.

7.1 Transaction Export

7.1.1 Facility and Emissions

To create a transaction file including emissions and risk data from the database select ***Transactions/Export Facility and Emissions*** from the main menu. The following dialog window will appear. The remainder of this section describes how to use this window.



First specify which facilities you want to include in the exported transaction file by selecting one of the circular radio buttons on the left side of the window. If you select ***Selected CO/AB/DIS***, then you must specify the County, Air Basin and District IDs in the text boxes on the left. Alternatively, you may select a COABDIS from a list by pressing the button labeled ***Select CO/AB/DIS***.

If you select ***User Defined Facility List***, then you must enter the name of a facility list file in the corresponding text box. To edit a list of facilities or open a new list, press the button labeled ***List File***. This will call up the list editor, which will allow you to build your own list of facilities from the database. For details on using the list editor refer to section 6.3.

If you choose ***UTM Range***, then you must specify a range of UTM coordinates in the text boxes on the left side of the window. The program will then generate a transaction file that includes all facilities whose location falls within those UTM coordinate boundaries. The transaction file will not include any facilities for which UTM coordinates have not been entered on the facility editing window (for details on editing facility data refer to section 5.9).

If you select ***All Facilities***, the transaction file will include data for all facilities in the current reporting year.

In the box labeled **File format**, CEIDARS 2.5 is the recommended choice. The current version of HARP and CEIDARS use this format and data can be read by either system. If for some reason you need to transfer data to an older version of CEIDARS or HARP, select the appropriate radio buttons.

In the box labeled **Time Period** you may enter a date. The transaction file will then only include data for facilities that have been modified after the date you specify. Typically, the date that you specify will be the date on which the last transaction file was sent to ARB (or whomever you are sending it to). This can substantially reduce the size of the transaction file and the time required to export and import the data. For example, if you know that you sent a complete transaction file to ARB in February 1997, but you wish to update their database so that it is current with yours, you could enter a date of 2/1/97. Then the transaction file will only include those facilities which have changed since February. There is no point in sending data which was last modified before that date, since it should already be current on the ARB system. If you do not know when the last exported transaction was done, or you want to be certain that both systems match, simply leave the date field blank. This will cause all selected facilities to be exported regardless of the date they were last modified.

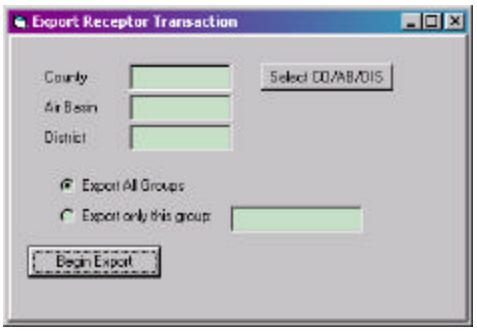
The program allows you overwrite a transaction file if it exists, or append it to the existing file. Check the appropriate radio button. The "Estimate missing EMS rates," "Estimate missing EMS factors," and "Estimate missing process rates" boxes can be used to perform analysis on the data in the database. Choose any appropriate buttons to export your data.

When you are ready to create the transaction file, select the ***Export*** menu option. You will be prompted for the name of the transaction file that you want to create. All transaction files

are assumed to have an extension of TRA. Transaction files are comma-delimited files that can be read with a text editor or imported into a spreadsheet in case you wish to review the contents.

7.1.2 Sensitive Receptors

If you only need to export sensitive receptor data, select ***Transaction/Export Receptors***. The following window appears:



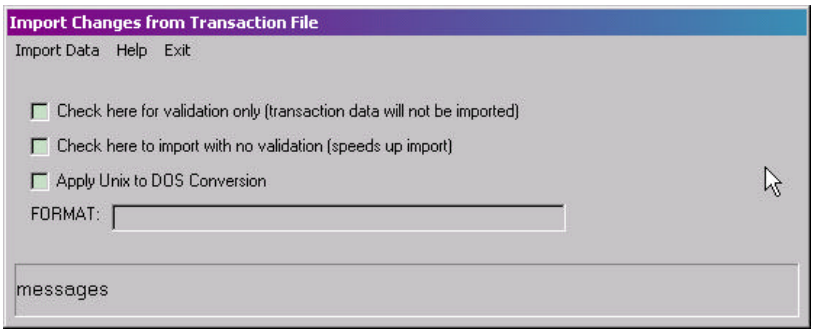
Specify the County, Air Basin and District IDs in the text boxes on the left. Alternatively, you may select a CO/AB/DIS from a list by pressing the button labeled ***Select CO/AB/DIS***. To export all receptor groups, check the circular radio button labeled ***Export All Groups***. To export a single group, such as schools or hospitals, check the circular radio button labeled ***Export only this group*** and supply the name defining this group.

When the selections are defined, press the ***Begin Export*** button and save the export transaction file in a file. The default file name extension is "rec" signifying the receptor transaction file.

7.2 Transaction Import

7.2.1 Facility and Emissions

This function is the inverse of the Transaction Export function described in the previous section. To import data including emissions and risk data from a transaction file into the database, select ***Transactions/Import Facility and Emissions*** from the main menu. The following dialog window will appear.



To read a transaction file and validate the date without actually importing it into the database, check the box labeled ***Check here for validation only***. This will prevent any changes to your database, but will check the input file for any errors or inconsistencies.

If the transaction was generated/exported from your database or from a reliable source, check the box labeled ***Check here to import with no validation***, the importing process will speed up. To import transaction data written from a Unix database – most likely data generated by the ARB, check the box labeled ***Apply Unix to DOS Conversion***.

When you are ready to import the transaction file, select ***Import Data*** from the menu. You will be prompted for the name of the file that you want to import. Locate the file using the Mouse button and double click to open it or type the full path of the file in the file name window.

Importing of transaction data is a three-step process. In the first step, the transaction data file is read and the data is copied into temporary tables in the database that resemble the permanent tables in structure. Any errors in syntax, format or order of imported data values will be found at this time. If any error occurs the process is terminated and the permanent database tables remain unchanged.

In the second step of the import process, the data records contained in the temporary tables are checked against existing data in the permanent tables to determine if there are any conflicts involving missing or redundant key fields. Once again, if any error occurs, the process is terminated and the permanent database tables remain unchanged.

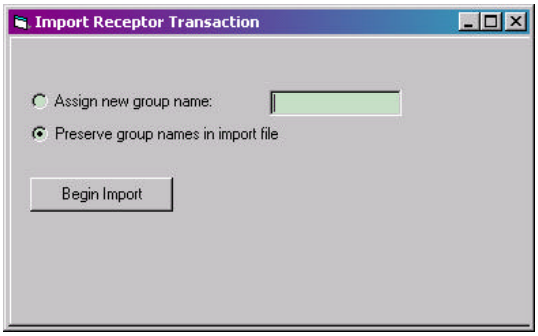
In the third step of the import process, the validated data records are copied from the temporary tables to the permanent tables, thus completing the entire process.

Any records in the transaction file that already exist in the database are overwritten with new data values. Any records in the transaction file that do not already exist in the database are added.

When data is imported from a transaction file, it will be stored in whatever reporting year is currently selected. For a description of reporting years refer to section 5.3.

7.2.2 Sensitive Receptors

Select ***Transaction/Import Receptors***. The following window appears:



To import sensitive receptor data from a file with a new group name, check the "***Assign new group name"*** circular button and supply the appropriate data. If the group names of the new data already exist in the sensitive receptor database, check the "***Preserve group names in the import file"*** radio button. Click ***Begin Import*** and supply the receptor transaction file to begin the importing process.

Chapter 8 Table of Contents

8. Prioritization

8.1 Prioritization Background

HARP performs the prioritization calculations in accordance with the guidelines set forth by the California Air Pollution Control Officers Association in the document entitled *CAPCOA Air Toxics "Hot Spots" Program Facility Prioritization Guidelines (July 1990)*. In addition, the HARP software automatically applies the appropriate molecular weight adjustment factor (MWAF) for each Hot Spots substance; therefore, facility emissions should not be manually adjusted before entering them into HARP (see Appendix I for a list of MWAFs, Chapter 4 of the OEHHA Guidance Manual for an example calculation, or the Emission Inventory Criteria Guidelines for reporting guidance).

Prioritization scores are used to determine which facilities shall complete a health risk assessment for the "Hot Spots" Program. Prioritization scores should not to be interpreted as estimates of potential health impacts. Only a health risk assessment can provide those types of estimates. This functionality is intended for District use.

Below is an overview of the prioritization process in HARP. See Appendix A for a set of simple "how to" guides that are intended to assist users with some basic HARP applications and chapter 4 for an example tutorial.

8.2 Prioritization Setup

Open the ***Facility Data*** window. If you have entered data for more than one facility, select ***List*** to bring up the data and select the facility of interest. If you want to start with a new facility, then you will need to add the facility according to instructions in section 5.9.

Once you have the facility of interest on screen, set the receptor proximity by selecting the tab in the center of the screen titled ***PAGE 3***. Next to the button labeled ***Receptor Proximity*** enter a value in meters and select ***Save.*** Note that if no value is entered for the receptor proximity, then HARP assumes that the distance is zero meters and no adjustment is made for the receptor proximity.

Next enter a ***Priority Multiplier*** (if applicable) and select ***Save***. This is a factor that is used to adjust a facility score. This could be used, for example, if a facility emits multipathway pollutants or has receptors within 50 meters.

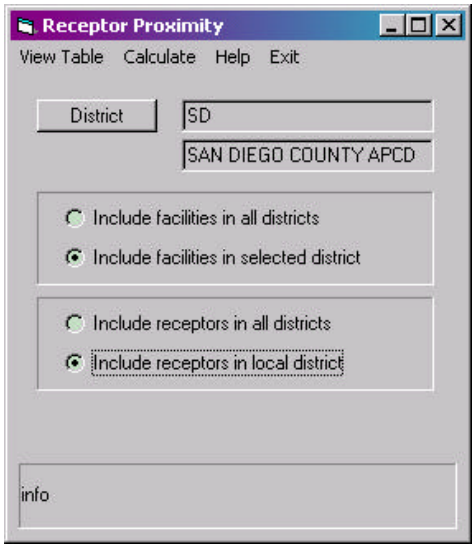
As an alternative, if you do not know the receptor proximity, but have entered set the facility boundary and identified the sensitive receptors, press the ***Receptor Proximity*** button and it will be automatically calculated. The receptor proximity is calculated based on the distance from the nearest sensitive receptor to the facility property boundary. To enter the facility boundary information, from the ***Facility Data*** window, select ***Geometry/Property Boundaries*** and populate the boundary information (e.g., UTMs) for the facility (see sections 4.4.6, 4.4.7, 5.16, 5.17 for more information). To input sensitive receptor information, go to the main HARP

window, enter the sensitive receptor database by clicking ***Edit Data/Sensitive Receptors***. Enter the data for the sensitive receptors (see sections 4.4.8 and 5.20 for more information).

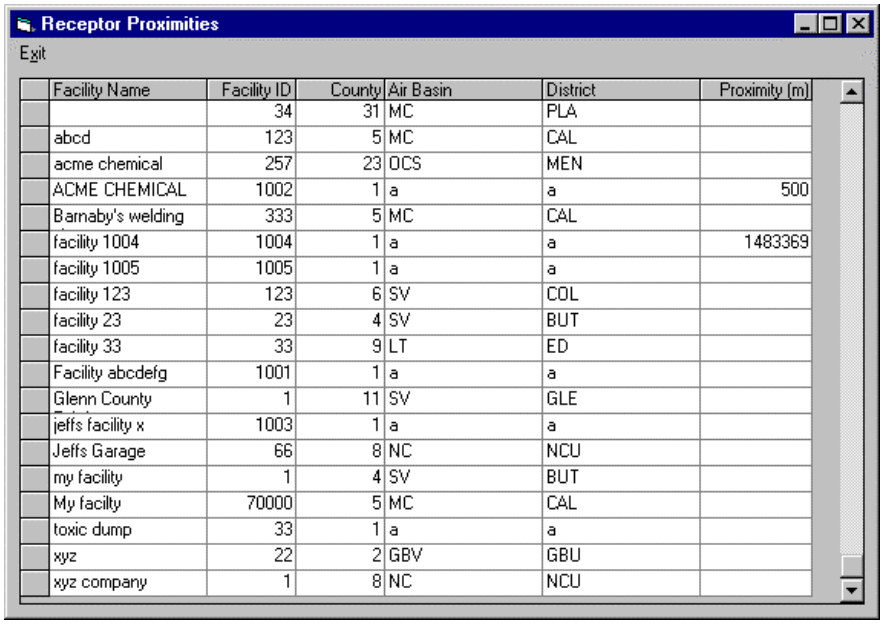
8.3 Calculating Receptor Proximities for Multiple Facilities

If you need to calculate receptor proximities for several facilities in a district, from the HARP main menu, select ***Utilities/Receptor Proximities***. The ***Receptor Proximity*** window will appear as shown below. Click the button labeled ***District*** and select the one of interest. Click the buttons ***Include facilities in selected districts*** and ***Include receptors in local district***. Select ***Calculate***. The receptor proximity data will be calculated and stored in the database. Click ***Exit*** to return to the HARP main window.

If you wish to update all facilities in you database regardless of district, click the buttons labeled ***Include facilities in all districts*** and ***Include receptors in all districts***. Select ***Calculate***. The receptor proximity data will be calculated and stored in the database. Click ***Exit*** to return to the HARP main window.



When you select the *View Table* option, a scrolling list of all facilities is displayed as shown below.



Facility Name	Facility ID	County	Air Basin	District	Proximity (m)
	34	31	MC	PLA	
abcd	123	5	MC	CAL	
acme chemical	257	23	OCS	MEN	
ACME CHEMICAL	1002	1	a	a	500
Barnaby's welding	333	5	MC	CAL	
facility 1004	1004	1	a	a	1483369
facility 1005	1005	1	a	a	
facility 123	123	6	SV	COL	
facility 23	23	4	SV	BUT	
facility 33	33	9	LT	ED	
Facility abcdefg	1001	1	a	a	
Glenn County	1	11	SV	GLE	
jeffs facility x	1003	1	a	a	
Jeffs Garage	66	8	NC	NCU	
my facility	1	4	SV	BUT	
My facilty	70000	5	MC	CAL	
toxic dump	33	1	a	a	
xyz	22	2	GBV	GBU	
xyz company	1	8	NC	NCU	

The program will calculate receptor proximities automatically when you select the ***Calculate*** menu option. You use the circular radio buttons to specify whether you want the calculation to be performed for all facilities and receptors in the database, or only for facilities and receptors in a single district. In the latter case, you must specify the district by clicking on the button labeled ***District***. As receptor proximities are calculated, the facility table is updated with the new values. Therefore you should be careful not to unintentionally perform this calculation and overwrite receptor proximities that have been manually entered.

Note that in order to calculate the receptor proximity for a facility, you must enter property boundary data for the facility by selecting ***Edit Data/Property Boundaries*** from the main menu. To understand why property boundary data is required, refer to footnote B, Appendix C or footnote B, Appendix F in the CAPCOA prioritization guidelines.

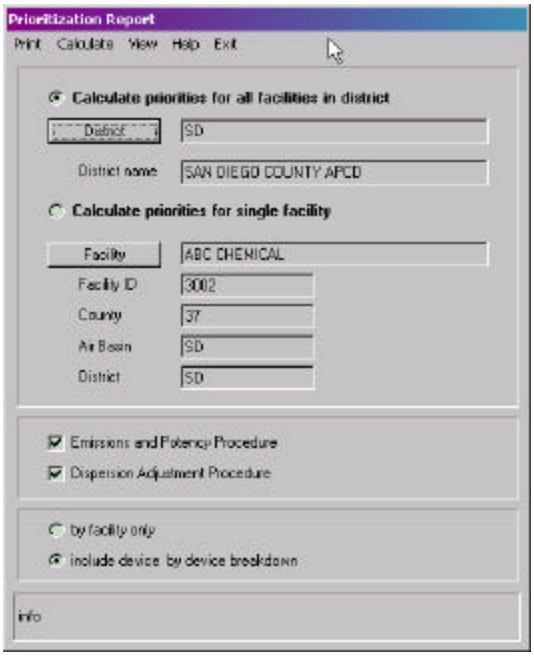
8.4 Prioritization Calculation

There are two ways to get to the prioritization analysis window.

1) From the main HARP screen enter the facility window by clicking on ***Edit Data/Facilities and Emissions.*** Next click on ***Calculate/Priority***. This will open the Prioritization Report window.

2) From the main HARP screen enter the facility window by clicking on ***Reports***. Next click on ***Prioritization***. This will open the Prioritization Report window.

Selecting ***Reports/Prioritization*** from the main menu accesses the prioritization report window. This will cause the following dialog window to be displayed. Follow the procedures described below to generate a facility prioritization report.



If at anytime you wish to view the receptor proximity or facility multiplier information for each facility, select ***View/Receptor Proximities*** for the Prioritization Report window. Also available in the ***View*** button are a list of the chemical potencies/health information and a summary report of the facility prioritization scores.

To calculate scores, first select one of the two circular radio buttons in the top part of the window to specify whether to generate a prioritization report for all facilities in a particular district, or for only a single facility. If you choose ***Calculate priorities for all facilities in district***, then you must select the district by pressing the button labeled ***District***. If you choose ***Calculate priorities for single facility***, then you must select the facility by pressing the button labeled ***Facility***.

Next select one of the two calculation methods to use, either the Emissions and Potency Procedure or the Dispersion Adjustment Procedure, or both. If both methods are used, the total facility score will be the larger of the scores calculated by the two methods.

Next select whether you want the prioritization report to include a device-by-device breakdown of the scores. Although the CAPCOA guidelines do not provide any guidance on how to do this, the method employed by the program to calculate each device score closely resembles the algorithm used for calculating an entire facility score.

The prioritization database can be updated in two ways. First, you may select ***Calculate Priority*** from the facility-editing window. This will update the priority for a single facility. Second, you may select ***Calculate/Update Priority Database*** from the prioritization window. This will either update a single facility priority or all facility priorities, depending on which of the two options is selected in the top portion of the window.

8.5 Printing/Display of Prioritization Reports

Once the priority database has been updated, you may print a report using one of three options under the Print menu:

Print/Preview Report	This will display the prioritization report in a preview window on the screen. To Print this report, select Print from the top of the page while viewing the report.
Print/Print Report to File	This will create a prioritization report and send it to a file.

Chapter 9 Table of Contents

9. Dispersion Analysis/Background Information

9.1 HARP Dispersion Analysis Background

Air monitoring data may identify levels of toxic air contaminants (TACs) in the ambient air. However, due to resource limitations, it is not practical to place monitors at all locations to evaluate the exposure of TACs to the general public. As a result, we use air quality models to estimate levels of TACs in the ambient air. This is a more practical approach because air quality models can simulate atmospheric processes on a large scale with a fine spatial resolution.

HARP uses the U.S. Environmental Protection Agency's (U.S. EPA) air quality model ISCST3 (Industrial Source Complex – Short Term 3) in combination with BPIP (Building Profile Input Program).

9.2 What is Air Dispersion Modeling?

Air dispersion models simulate the atmospheric transport and fate of a pollutant from the point of emission to the location of impact to arrive at ambient air concentration estimates of the pollutant. The transformation (fate) of an airborne pollutant, its movement with the prevailing winds (transport), its crosswind and vertical movement due to atmospheric turbulence (dispersion), and its removal amounts due to dry and wet deposition are influence by the pollutant's physical and chemical properties and by meteorological and environmental conditions. Factors such as distance from the source to the receptor, meteorology, intervening land use and terrain, pollutant release characteristics, and background pollutant concentrations affect the predicted air concentration rate of an air pollutant. Estimates of the amount of gaseous and particulate material deposited by wet and dry process on outdoor surfaces are also necessary to assess impacts of toxic air pollutants. [From U.S EPA fact sheet: *Computer Modeling: Dispersion Models*. www.epa.gov/ttn/atw/wks/fs-dispmodel.pdf.]

9.3 What is ISC?

HARP performs air dispersion analysis by using the U.S. Environmental Protection Agency's (U.S. EPA) ISCST3 (Industrial Source Complex) air dispersion model. ISCST3 is a steady-state Gaussian air dispersion model which can be used to assess pollutant concentrations from a wide variety of sources associated with an industrial complex to a distance of 50 kilometers [From U.S EPA fact sheet: *Computer Modeling: Dispersion Models*. www.epa.gov/ttn/atw/wks/fs-dispmodel.pdf]. ISC incorporates three previous programs into a single program. These are the short-term model (ISCST), the long-term model (ISCLT) and the complex terrain model (COMPLEX). All three types of analysis are now done with the same program by controlling the input. For the purpose of risk assessment in HARP, only the short term and complex terrain options are utilized.

ISCST3 is available on the U.S. EPA SCRAM web site (http://www.epa.gov/scram001/) in both executable and source code form. The version of ISCST3 that is delivered with HARP includes some additional post-processing and output that makes it much more efficient to perform risk analysis in terms of disk storage and computation time. None of the algorithms or

output options have been altered from the original U.S. EPA version. The executable program file for the enhanced version of ISC is included on the HARP setup disks and is automatically installed when you install HARP. HARP uses ISCST3 version number 99155.

9.4 What is BPIP?

BPIP (Building Profile Input Program) is a U.S. EPA model that calculates the impact of building downwash. Building downwash is the creation of cavity zones by air moving around buildings. BPIP calculates building heights and projected widths. It will determine whether or not a stack is being subjected to wake effects from a structure or structures to calculate building downwash. BPIP then generates a file that is read by ISCST3 to simulate the building downwash effects of one or several buildings on a stack. (U.S. EPA, 1993)

BPIP is a preprocessor that converts the building geometry into a format that can be input directly into ISCST3. If you want to include building downwash in the ISCST3 calculations, running BPIP is a necessary step. This is made quite easy in HARP. If the *Include Building Downwash* parameter is set to YES on the *Control* window of the HARP Dispersion window, then when you set up and run ISC HARP does the following steps:

1. For each source that is listed on the *Sources* sheet of the ISC workbook, HARP looks up the building(s) geometry for the facility (i.e. the facility that that particular source belongs to).
2. Using the building geometry, HARP builds an input file for the BPIP program.
3. HARP runs BPIP. BPIP produces an output that is in a format that can be inserted into an ISC input file.
4. HARP reads the BPIP output and inserts it into the correct location in the ISC input file.
5. The steps above are repeated for each source (release point)

Building downwash is only calculated for point sources (not volume or area sources). The building geometry is not displayed on the ISC workbook. If you want to edit it, you must go back to the emissions inventory database, select the facility, and then select the Geometry menu item from the facility window. HARP cannot run BPIP for facilities that do not have building data in the HARP database. For further details on the BPIP program, you should consult the BPIP manual, which is included in the references directory of the HARP installation disk.

9.5 Complex Terrain

Complex terrain is defined as terrain above the final plume rise. Since HARP uses ISCST3 for complex terrain modeling, results from the HARP program for complex terrain are screening only. Should the results from HARP with ISCST3 indicate further analysis is required, we refer the user to the Office of Environmental Health Hazard Assessment (OEHHA) document *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* to select a refined complex terrain air dispersion model.

9.6 Functional Overview

The dispersion analysis module of HARP supports the following two steps, which are required to perform a dispersion analysis:

1) Building an input file for ISCST3 and BPIP
2) Running ISCST3 and BPIP

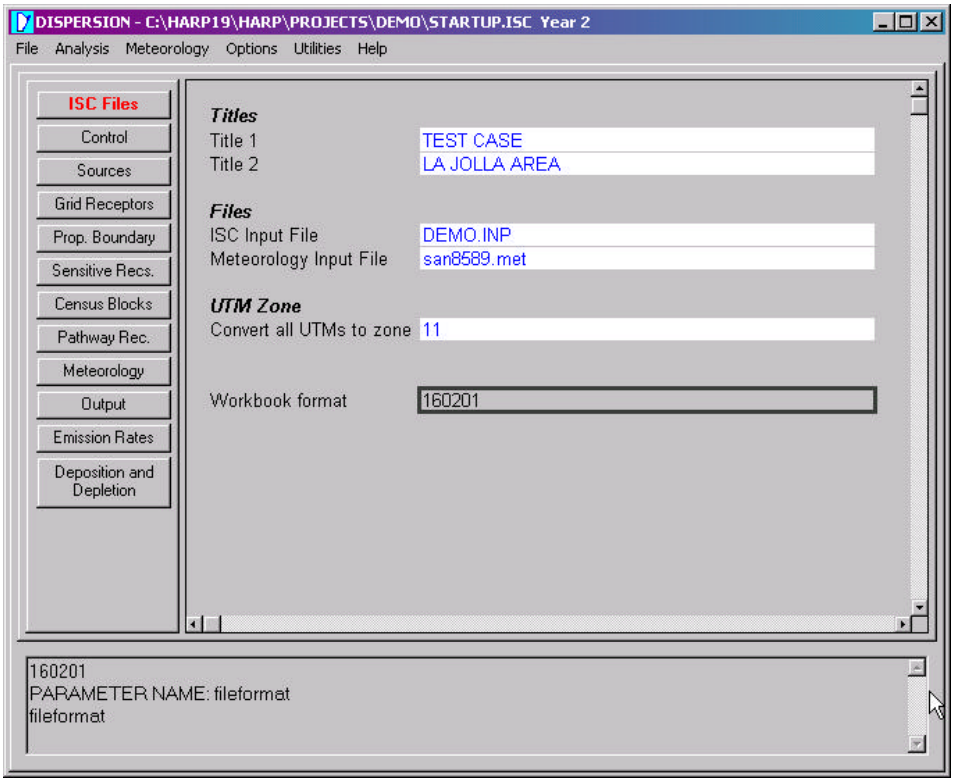
Running ISCST3 is a trivial matter. It can be done from the DOS prompt, but for convenience it can also be run by selecting a menu option in HARP, so that you do not have to worry about the syntax of running it or the specification of the input and output files.

Setting up the ISCST3 input file is not trivial at all. Fortunately, the format of the input file is well documented and well organized. But the file itself can be large and complicated when many sources and receptors are involved. The order, and to some extent the spacing, of the input parameters in the file are important. HARP provides a user-friendly front-end that takes care of most of these details for you. As you will see from running HARP, there is still a large amount of input that you must provide. However, the difficult and tedious aspects of building the input, such as specifying the locations of a large number of receptors on a facility property boundary or on a spatial grid, are automated. Perhaps more importantly, you do not have to reenter parameters that are already in the HARP database in order to run the dispersion analysis. HARP will extract source and receptor data from the database and place it on the workbook where it can be edited. HARP will then write the contents of the workbook to the ISCST3 input file in the correct order and format.

9.7 Setting up a Dispersion Problem

HARP stores all parameters associated with a particular dispersion analysis in a single file known as a HARP workbook file (refer to section 9.8 and Appendix B for a description of files used by HARP and ISCST3). The default HARP workbook file has the name STARTUP.ISC. To set up a dispersion problem, you can use HARP to open and edit the contents of the workbook file. Since the workbook file is organized like a spreadsheet, it is much easier to edit the workbook file than to edit the ISCST3 input file directly. HARP provides a number of functions that allow you to populate the workbook file with data taken directly from the database. This enables you to easily set up problems for sources and receptors contained in the database with minimal additional data entry.

To edit ISCST3 input, select ***Analysis/Dispersion Analysis*** from the HARP main menu. You will see two more options. If you intend to use screening meteorology data, select ***Dispersion Analysis (Screening Met Data)***. If you intend to use real meteorology data representative of your site, select ***Dispersion Analysis (Representative Met Data)***. The Dispersion window will appear similar to the picture below:



Data is entered in a manner similar to a spreadsheet. White cells are for input. Each of the buttons on the left selects a different subset of the input data, similar to selecting worksheets on an Excel workbook. Details of each of the worksheets are provided later in this section.

After you have specified all of the input in the workbook file, HARP will use this information to build an ISCST3 input file. You can build the ISCST3 input file and run ISCST3 in a single step by selecting ***Analysis/Build ISC Input and Run*** from the dispersion menu (refer to section 9.11 for a detailed description of how to run ISCST3).

The following is a summary list of the input required for running a dispersion problem. Detailed descriptions of all input parameters are provided in section 9.12, Data Editing Details/Worksheet Descriptions.

File Names	You must specify the names of the ISCST3 input and output files. To do this, first click the ***ISC Files*** button. Then fill in the titles, file names, and UTM zone (refer to section 9.12.1). **Remember <u>NO</u> Spaces in the file names.**
Control	This worksheet specifies the run control parameters, which provide overall program control. If you wish to run the regulatory defaults, no changes need to be made to this worksheet. First click the ***Control*** button. Then fill in the parameters on the Control worksheet (refer to section 9.12.2).

Sources	You must provide a description of the emission sources. First click the ***Sources*** button. Then fill in the parameters on the Source worksheet. The ***Sources*** menu option will appear, which allows you to build a source list from facility stack data that already exists in the database (refer to section 9.12.3).
Receptors	You must provide information describing one or more of the following types of receptors: 1) Cartesian grid (see section 9.12.4) 2) property boundary receptors (see section 9.12.5) 3) sensitive receptors (see section 9.12.6) 4) census blocks (see section 9.12.7) 5) pathway receptors (see section 9.12.8)
Meteorology	You must provide a meteorology file in one of the standard formats compatible with ISCST3. The name of the file should be specified on the ISC File Names worksheet. First click the ***Meteorology*** button. Then fill in the parameters on the Meteorology worksheet (refer to section 9.12.9).
Output	You must specify output parameters to define what types of results you want to have reported. First click the ***Output*** button. Then fill in the parameters on the Output worksheet (refer to section 9.12.10).

The following are optional parameters that you may specify to provide more detailed control over the analysis.

Emission rate factors	These parameters are used to specify temporal variation of emission rates for individual sources. To edit these parameters click on the ***Emission Rates*** button (refer to section 9.12.11). This is a non-regulator option for ARB, and is therefore not recommended or required.
Deposition and Depletion	These parameters describe particle size distributions which are used for calculation of gravitational settling and removal by dry deposition of particulates. To edit these parameters click the ***Deposition and Depletion*** button (refer to section 9.12.12). This is a non-regulator option for ARB, and is therefore not recommended or required.

9.8 Files

This section describes the files associated with setting up and running ISCST3 using HARP. HARP will save all of the ISCST3 input and output files into your project directory. All of the ISCST3 input and output files can be viewed in a word processor. For a list of all of the files that HARP uses/creates, see Appendix B.

9.8.1 HARP Workbook File (File extension *.isc)

HARP stores all parameters associated with a particular dispersion analysis in a single file known as a HARP workbook file. The workbook contains several worksheets, or pages, each of which corresponds to a parameter group. The information in a workbook file is used to generate the input file to ISCST3. Using HARP, you can open a workbook, edit it and save it, either to the same file or a new file. This can be done independently of the database, or you can populate portions of the workbook with data extracted directly from the database by using functions accessible through the HARP menus. The various data editing functions are described in sections

Use the selections under the ***Files*** menu to open and save ISC workbook files.

9.8.2 ISCST3 Input File (File extension *.inp)

The ISCST3 input file is the main source of input to the ISCST3 program. It describes sources, receptors and numerous input and output options. It is a text file, which can be viewed or edited with any general-purpose text editor. The format of the ISCST3 input is described in detail in the *User's Guide for the Industrial Source Complex (ISC) Dispersion Models*. The ISCST3 input file is created by HARP when you select ***Analysis/Build ISC Input File*** or ***Analysis/Build ISC Input and Run*** from the menu. You specify the name of the ISC input file on the ***Files*** sheet of the workbook. **Note: Don't add any spaces when naming a file or directory.**

9.8.3 Source-Receptor File (File extension *.src)

The source-receptor file (often called an SRC file) is a file that is created by HARP when you run the dispersion analysis. It contains a list of all of the sources (stacks) and receptors that were used in the ISCST3 input, as well as details about those sources and receptors that are necessary to complete the risk analysis.

To perform risk analysis, HARP uses the X/Q values provided by ISCST3. CHI/Q or chi/q or χ/q is the concentration estimated from an air quality model based on an emission rate of one gram per second input to the model. Chi/q can be efficiently used to estimate the concentration of multiple inert pollutants simply by multiplying by the emission rate in grams per second. In this way, one model run may be conducted to evaluate the impact of several different inert pollutants. The X/Q values are combined with the emission rates (usually taken directly from the emissions database) to determine ground level concentrations (GLCs) of each of the pollutants.

A source-receptor file is required to perform a risk analysis because the normal ISCST3 input and output files do not contain sufficient information to determine which sources in the dispersion results correspond to which stacks in the database. Without this information, HARP cannot determine emission rates. The ISCST3 input and output files also lack descriptive information about the receptors. The SRC file contains information that allows HARP to distinguish between grid receptors, boundary receptors, census block receptors, and so forth. (see

sections 9.11 and 9.12 for instructions on setting up and running the dispersion analysis using ISCST3)

Most users will never have to look at the contents of an SRC file. However, you should know that:

1) It is an intermediate file that links the results of the dispersion analysis with the contents of the emissions database and subsequently with the risk analysis;
2) That you must have an SRC file in order to perform the risk analysis; and
3) That the SRC file is created automatically when you run the dispersion analysis.

Source-receptor files always have an extension of SRC. The full name of the file is determined by the name of the ISCST3 input file that you specified when running the dispersion analysis. For example, if you specified that the ISCST3 input file should be called DEMO.INP, and then the corresponding SRC file will be called DEMO.SRC. Thus all input and output files generated by a single run of the dispersion analysis will have the same root name but different extensions.

9.8.4 Meteorology File (File extensions *.met; *.txt; *.dat; *.sam; *.asc)

The meteorology file contains time series of wind velocity and direction, and various other parameters describing the wind profile that are required by ISCST3. The meteorology file can have different formats that are described in Appendix F of the *User's Guide for the Industrial Source Complex (ISC) Dispersion Models.*

9.8.5 Plot File (File extension *.plt)

The plot file is an output data file created by ISCST3 that contains information in a format suitable for importing into a spreadsheet or other plotting program. When you run ISCST3 from HARP, the name of the plot file is that same as the name of the input file, but with a **.plt* extension.

9.8.6 Post File (File extension *.pst)

The Post file is an output data file created by ISCST3 containing detailed results in a format suitable for post processing. It contains pollutant concentrations at each receptor point, from each source, for each time step of the simulation. This file may be either ASCII or binary depending on which option you choose. Since the amount of data in this file is typically quite large, it is normal to specify a binary format to conserve disk space. This file is the primary source of input data for the health risk assessment. When you run ISCST3 from HARP, the name of the plot file is that same as the name of the input file, but with a .pst extension.

9.8.7 XOQ File (File extension *.xoq)

This file contains the dilution factors (X/Q) for each source-receptor combination after an ISCST3 run. This file is always created automatically. It is an enhancement to ISCST3 specific to HARP that simplifies risk analysis and reduces file storage size.

9.8.8 Bin File (File extension *.bin)

This file contains hourly X/Q values for the entire simulation for each source-receptor combination in a binary format. This file is used only for calculating maximum hourly acute risk and can be very large. When you run ISCST3, you will be prompted whether you want to generate this file.

9.8.9 ISC Output File (File extension *.out)

The ISCST3 output file contains model run time information including all input parameters and all requested output fields. The format is suitable for viewing and printing in landscape mode. The exact contents and file size are determined by the input parameters specified in the HARP Output parameter group (refer to section 9.12.10). When ISCST3 is executed from HARP, the ISCST3 output filename is the same as the HARP input filename where the extension is changed to .out.

9.9 ISC Internal Post-Processing

9.9.1 Additional Output Files

The version of ISCST3 that is used by HARP has been modified to provide additional post processing and output that is necessary to carry out risk analysis. No changes have been made to the standard files or the algorithms in ISCST3. This version of ISCST3 generates the following additional files.

XOQ This file contains the average and maximum X/Q values for each source receptor combination. The maximum X/Q values are calculated for various averaging times. This is required for risk analysis because different chemicals have acute reference exposure levels based on different averaging times. HARP automatically uses the correct averaging time for each chemical. The XOQ file is generated by ISCST3 by means of additional post processing routines that have been added to the version of ISCST3 that is delivered with HARP.

BIN The BIN file is generated by ISCST3 and holds binary X/Q information for every source/receptor combination for every hour of the simulation. It is similar to the ISCST3 POSTFILE, however the information is in a more structured format that makes it more suitable for post-processing. Unlike the POSTFILE, the BIN file format and contents are independent of the output options that you choose, which also make it simple to process. The data in the BIN file is used for the detailed acute risk analysis, which requires an hour-by-hour calculation of acute risk for the entire duration of the ISCST3 run. The

BIN file can be quite large for long simulations and large numbers of sources and receptors.

9.9.2 Averaging Times for Acute Risk

For an acute analysis, the OEHHA guidelines recommend using a ground level concentration that is based on the same averaging time that was used to determine the acute reference exposure levels. For most chemicals this is the 1-hour maximum, which is the value output by ISCST3. For other chemicals, the appropriate averaging time is 4, 6, or 7-hours. (See Appendix I for a list of acute Reference Exposure Levels and their averaging times.)

9.9.3 CALMS Processing

The option for CALMS processing is found under the Control Worksheet in the Dispersion Module. CALMS processing omits averaging periods when the number of calm hours during that averaging period are excessive. See the US-EPA's Appendix X to part 51 - Guideline on Air Quality Models (2001) for further details.

The regulatory default is to use the CALMS processing routine. Some Districts may have other preferences for the CALMS processing routine (e.g., the SCAQMD recommends NOCALMS for the meteorological data sets provided by their District).

The average and maximum values of X/Q will vary depending on whether or not CALMS processing is selected. ISCST3 will output the corresponding values to the X/Q file. Because these maximum values change with CALMS processing, the acute risk values will also depend on whether you choose CALMS processing.

ISCST3 does not have algorithms to compute all averaging periods that are required for the OEHHA risk assessments guidelines. Specifically, the 4, 6 and 7-hour averages needed for acute RELs are not available from ISCST3.

HARP overcomes this ISCST3 limitation by computing the 4, 6, and 7-hour averaging periods separately from the air quality model. HARP uses the NOCALM processing for estimating these acute averaging periods regardless of whether the user selects CALMS or NOCALMS in the ISCST3 computer modeling input file.

HARP computes the 4, 6, and 7-hour averages by a true running average, as opposed to a block average. A block averaging scheme for a 4 hour average moves through the time history 4 hours at a time. For example, it averages hours 1-4, and then averages hours 5-8, then hours 9-12, and so on. The maximum value of all of these 4-point averages over the entire time series is termed the 4-hour maximum. A true running average, on the other hand, moves through the time history 1 hour at a time, averaging each sequential set of 4 points as it goes. For example, it averages hours 1-4, then averages hours 2-5, then hours 3-6, and so on. The block averaging scheme, while being faster, could miss the true maximum, which might be the average of points 3-6, for instance. The true running average is certain to find the true maximum of the 4-hour average and is therefore more health protective.

The 30-day average is not actually used by HARP for a risk calculation as of this writing. It has been implemented in anticipation of using it for the analysis of lead. For more information on conducting a risk assessment for noncancer lead exposure, see Appendix F of the OEHHA Risk Guidance Manual, or the Risk Management Guidelines for New, Modified, and Existing Sources of Lead (ARB, 2001). Nevertheless, we will describe here the method for obtaining the 30-day maximum concentration. The goal is the same as for the other averaging times. We would like to find the maximum value of the 30-day running average of the concentration. It turns out that in order to do this as rigorously as the 4, 6 and 7-hour averages (that is, by advancing the samples one hour at a time) requires an excessive amount of computer memory. Therefore a compromise solution has been implemented. The 30-day maximum is computed by advancing the sample 24 hours at a time rather than one hour at a time. This could theoretically result is a missed peak, but since the long average tends to smooth out peaks anyway, it has been deemed that this is a reasonable approximation. It is certainly far more accurate than taking a 30-day block average, and far less demanding or resources than a true hour-by-hour running average.

9.10 How to Setup and Run the Dispersion Module

This section describes general procedures for editing ISC input parameters.

9.10.1 Prerequisites - Data Needs

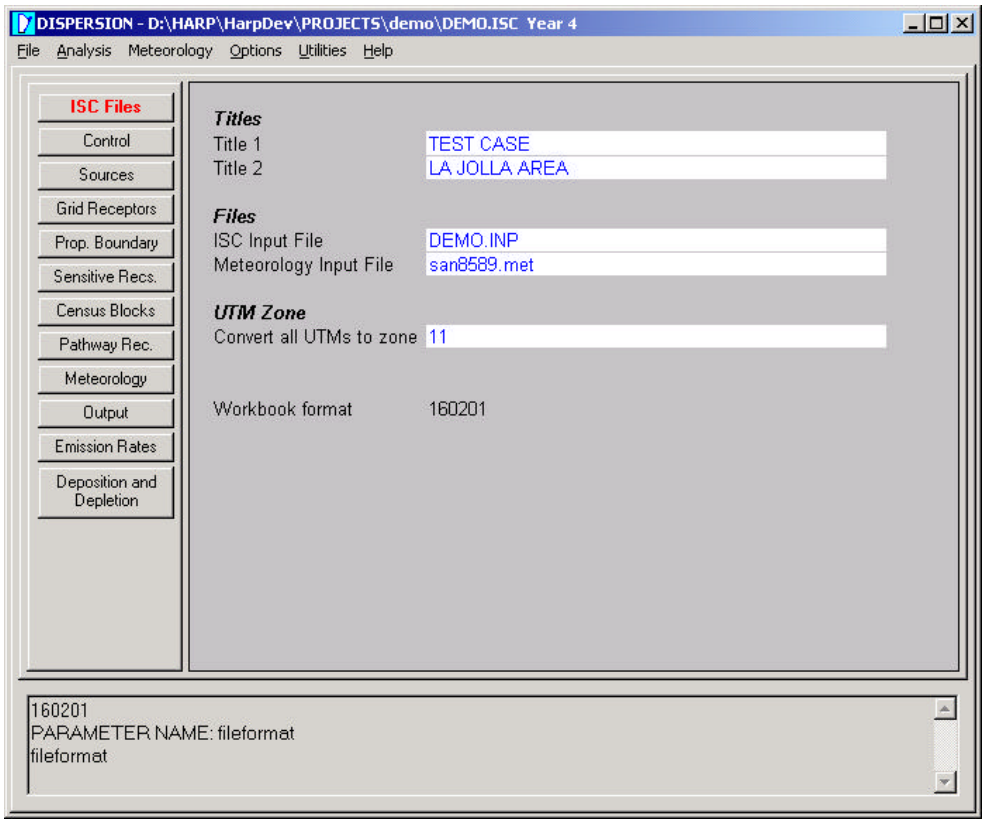
Before you can set-up your air dispersion run, you must have already entered data for the facilities you wish to analyze in the CEIDARS-Lite (emission inventory) database. If you wish to run building downwash, you need to have entered building geometry data into the CEIDARS-Lite database. For information on how to enter facility data, see chapter 5, tutorial in chapter 4, and How To # 2 in Appendix A.

9.10.2 Dispersion Analysis Window (Main Dispersion window)

HARP stores all parameters associated with a particular dispersion analysis in a single file known as a HARP workbook file (refer to section 9.8 and Appendix B for a description of files used by HARP and ISCST3). The default HARP workbook file has the name STARTUP.ISC. To set up a dispersion problem, you can use HARP to open and edit the contents of the workbook file. Since the workbook file is organized like a spreadsheet, it is much easier to edit the workbook file than to edit the ISCST3 input file directly. HARP provides a number of functions that allow you to populate the workbook file with data taken directly from the database. This enables you to easily set up problems for sources and receptors contained in the database with minimal additional data entry.

The dispersion analysis window always shows one worksheet of the dispersion analysis workbook. The workbook collects the ISC input data and creates the ISC input file. The workbook is divided, by topic, into worksheets. In the example below, the workbook is *STARTUP.ISC* and the ***ISC Files*** worksheet is displayed.

The text at the very bottom of the window is the On-line help, which is described in section 9.10.5.



9.10.3 Opening and Saving Workbooks

A workbook is a multi-page spreadsheet that allows you to edit all of the ISC input parameters. The workbook is displayed in the dispersion analysis window, one worksheet at a time. Each workbook is stored in a file having an extension of *ISC*. To open an existing workbook file select ***File/Open*** from the menu. Select the file you want to open from the dialog box.

After you have made changes to a workbook, you can save it as the same file or a different file for latter use. To save the workbook to the same file, select ***File/Save*** from the menu. To save the workbook to a different file, select ***File/Save As*** from the menu. It is recommended that you do this frequently if you are making many changes. Then if you make a mistake, you can always revert to the most recently saved workbook file to undo your changes.

9.10.4 Editing and Moving Around

To display a different worksheet of the workbook, select one of the buttons shown on the left side of the window. Each worksheet corresponds to one of the parameter groups, which are described in section 9.12.

The workbook behaves like most spreadsheets. You may change the value of any of the input parameters by moving the cursor to the corresponding cell and typing in a new value. When you press *Enter* or one of the arrow keys, the value will be stored in the cell, replacing whatever value was there previously. To edit the value in a cell without retyping it completely, move the cursor to the cell and press ***F2***. Pressing *ESC* at any time cancels the most recent typing and causes the cell to revert to its previous value.

The cells are color-coded to clarify which cells can be edited. White cells are input parameters that you can edit. Gray cells are either not used or contain labels for your information. Gray cells are locked so that you are prevented from entering data into them.

If you press the *Enter* key at any time, the cursor will automatically move to the next data input cell on the currently displayed worksheet. This facilitates sequential data entry by allowing you to type a series of values, each followed by the *Enter* key, without having to use the arrow keys to move to the next input cell.

Input data is validated as you enter it. If you enter a value that is not allowed, an error message will immediately appear when you press *Enter* or try to move to a new cell. Before the program will allow you to move to a new cell, you must either correct the error or press *ESC* to cancel the changes.

9.10.5 Using the On-line Help

Each time the cursor is moved to a new cell, a description of the contents of that cell will appear in the help box at the bottom of the window. Immediately below the description is a line labeled ALLOWABLE VALUES, which tells you what you are allowed to enter into that cell. If the input parameter in that cell has dimensions, the units of measurement will also be displayed in the help box.

9.11 Running ISC

9.11.1 Launching ISC from HARP

The most common way to run ISC is to select ***Analysis/Build ISC Input and Run.*** This will cause HARP to build the ISC input file using all of the parameters that you specify on the workbook. HARP will then run ISC and wait for it to finish. The names of the ISC input and output files are specified on the Files worksheet, which can be viewed by selecting the ***ISC Files*** button. The names of the ISC input and output files are automatically passed to ISC as command line arguments by HARP.

The ISC program itself is contained in the file *ISC.EXE*. This file must reside in the same directory as *HARP.EXE*, which is where the setup program normally installs it.

There are two other options under the Analysis menu. You may select ***Analysis/Run ISC***, which causes HARP to run ISC without first building the input file. This is seldom done,

but might be useful if you have edited the ISC input file outside of HARP (for example with a text editor) and do not want HARP to overwrite your changes. In this case HARP will not create the ISC input file nor check its validity. It will simply run ISC using the input file that you specify, which must already exist. You may also select ***Analysis/Build ISC Input File***. This will cause HARP to build the ISC input file but not run ISC. This is sometimes done to check that all of the input parameters are valid, or if you want to examine the ISC input file before actually running ISC.

9.11.2 Running ISC Outside of HARP

ISC is included with the HARP installation disks and automatically installed in the same directory as HARP. It has been recompiled from the original source code using the DEC FORTRAN 5 compiler. ISC can be run from a command window by entering the following command:

ISC <inputfile> <output file> <X/Q file> <bin file>

Where <inputfile> and <outputfile> are the names of the ISC input and output files, and <X/Q file> is the name of the X/Q (dilution factor) file. These files names may contain a complete directory path. If the path is missing, the files are presumed to exist in the same directory as ISC.EXE. <bin file> is optional. If it is included on the command line then the binary X/Q file will be created, which contains dilution factors for every hour.

For further details on running ISC refer to the *User's Guide for the Industrial Source Complex (ISC) Dispersion Models* (which is included on the HARP installation CD). Note: If you run ISC outside of HARP, the ISC results cannot be read by HARP. The risk module in HARP requires that there be an SRC file (source receptor file) in addition to the XOQ file. The SRC file is needed to interpret the meaning of each of the sources and receptors. It allows HARP to distinguish between census block receptors and grid receptors and pathway receptors, for example. It also allows HARP to determine which particular facility and stack a source is associated with, so it can look up the emissions in the database. HARP has to create a separate SRC file when it runs ISC.

9.11.3 Viewing Results

ISC writes the results of the dispersion analysis to the output file, whose name is the same as the input file, but with a *.OUT* extension. The ISC output file is a formatted ASCII file, which can be viewed with any text editor. (See Appendix B for a list of file extensions used/created by HARP.)

9.11.4 Trouble Shooting

Although HARP does quite a lot of validation of the input, it cannot catch all possible errors that might occur within ISC. If errors occur during an ISC run, there will usually be error messages at the end of the ISC output file. Typically, these messages are quite clear and will point to the problem. For further details on error messages in the ISC output file refer to the

User's Guide for the Industrial Source Complex (ISC) Dispersion Models that is included on the installation CD. The ISC output file can be viewed with any text editor.

There is an Y2K warning that will appear after every run of ISC in HARP. This warning looks like this:

******** WARNING MESSAGES ********
ME W360 1033 SET_WI:2-Digit Year Specified: Valid for Range 1950-2049 SURFDATA

This warning occurs if the meteorology file contains years with only two digits. ISC resolves the ambiguity by interpreting this to mean the years are in the range of 1950 to 2049. In other words, 02 is interpreted as 2002, not 1902.

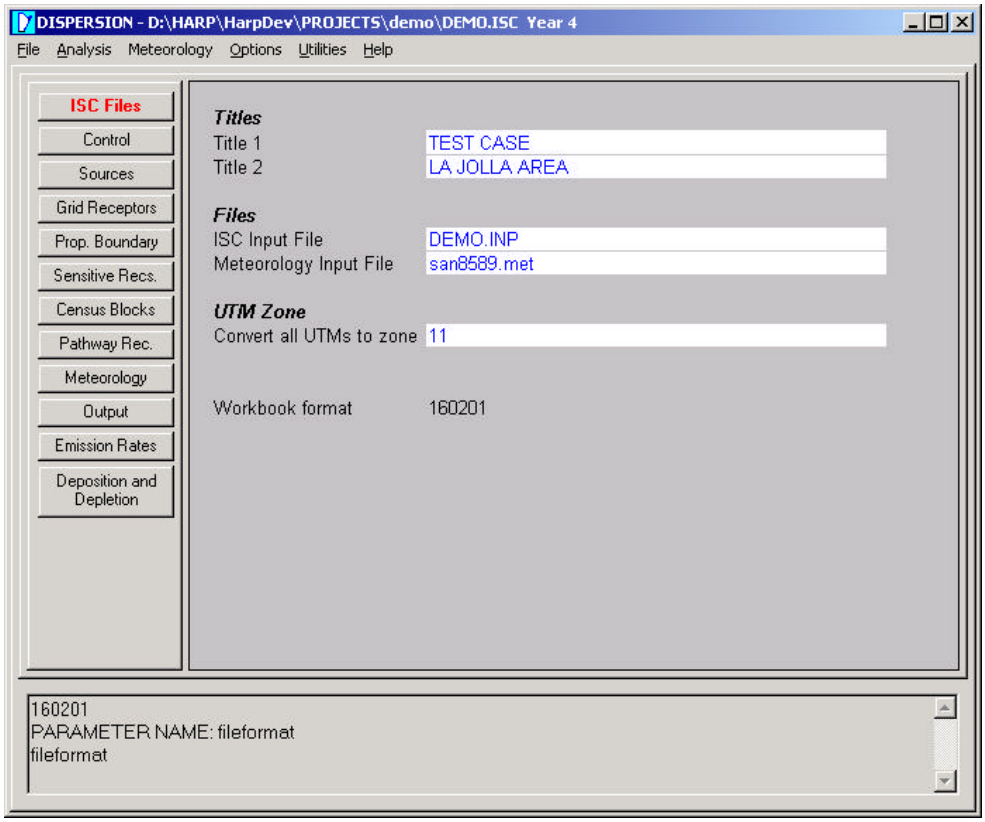
9.12 Data Editing Details/Worksheet Descriptions

9.12.1 ISC Files Worksheet

The dispersion analysis input parameters are divided into groups for organizational convenience. These groups correspond roughly to the input pathways described in the *User's Guide for the Industrial Source Complex (ISC) Dispersion Models*. The Receptor Pathway parameters in the ISC user's guide have been broken down into several subgroups that represents the different types of receptor configurations that might be used for a particular analysis. Receptors from one or more of these groups may be included in the ISC run.

Each parameter group can be viewed or edited by selecting the corresponding button. This section summarizes each of the groups. The following sections provide detailed descriptions of the parameters within each group.

The ISC Files worksheet is shown below. This worksheet is used to describe all of the input and output files which will be used by ISC, and the titles for this run. The following list describes each of the parameters on this worksheet.

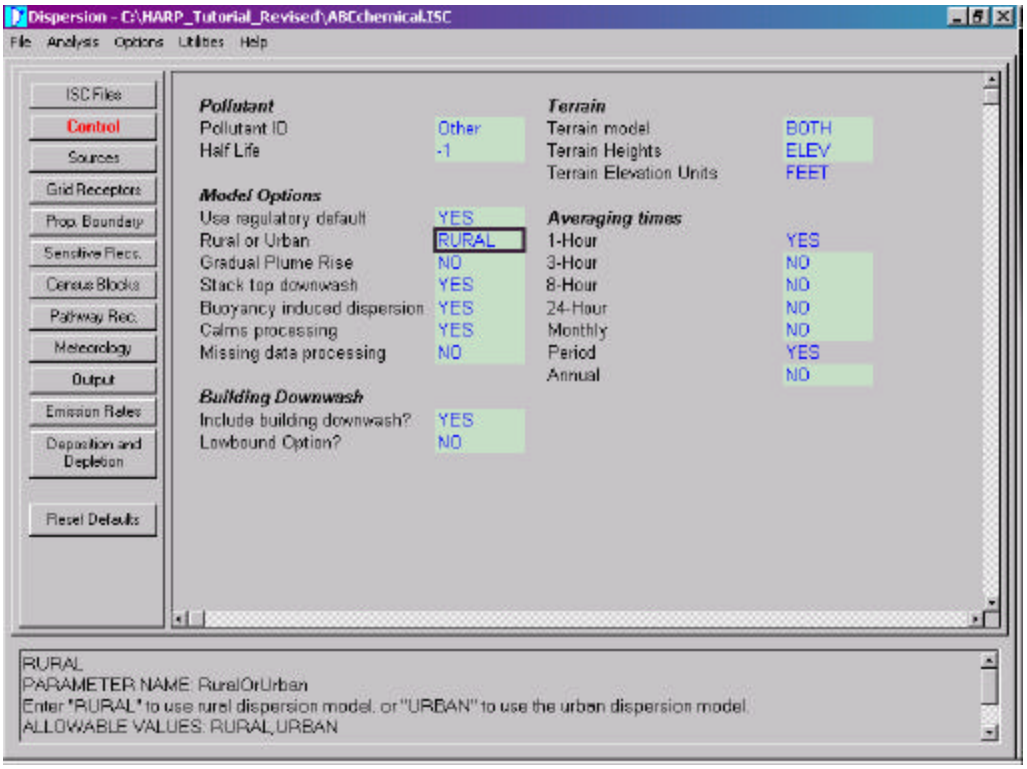


9.12.1.1 File Name Parameters

Title 1	Title of this run, which will appear at the beginning of the ISC output file. This may be any text up to 68 characters long.
Title 2	Secondary title of this run, which will appear at the beginning of the ISC output file. This may be any text up to 68 characters long.
ISC Input File	Name of the ISC input file and output file which will be created by HARP when you select ***Run ISC*** or ***Build ISC Input file*** from the menu. If the path is omitted, the file will reside in the default directory specified above.
Meteorology Input File	Name of the meteorology data file. ISC will read this file to get hourly wind data. You must include the full path to the file. The file must contain data matching the start and end times which are specified below. If the path is omitted, the file will reside in the default directory specified above. To edit this cell press ***F2*** on the keyboard.
UTM Zone	All UTM coordinates will be converted to this zone. This takes care of problems that might arise if a UTM zone boundary runs through the middle of your analysis area (as with Santa Barbara).

9.12.2 Control Worksheet

The Control Parameters worksheet is displayed below. This worksheet is used to input several parameters which provide overall control of the ISC run. Section 9.12.2.1 describes each of the parameters on this worksheet.



9.12.2.1 Control Parameters (Control Worksheet)

Pollutant ID	The Pollutant ID identifies the type of pollutant being modeled. Any name of up to eight characters may be used. Inputting "SO2" with the Urban default options forces use of a half-life of 4 hours for exponential decay. Otherwise this parameter is just for information. For risk assessment, ISC is used to compute X/Q factors which may be applied to multiple pollutants so the identification of the pollutant in this parameter is not particularly relevant.
Half-Life	Half-life used for exponential decay. Enter zero or blank to indicate that this parameter is to be omitted from the ISC input.
User Regulatory Default	Enter Y to specify that regulatory default options will override model options entered by user. Otherwise enter N. Entering Y will override specification of gradual plume rise, stack top downwash, buoyancy induced dispersion, calms processing, and

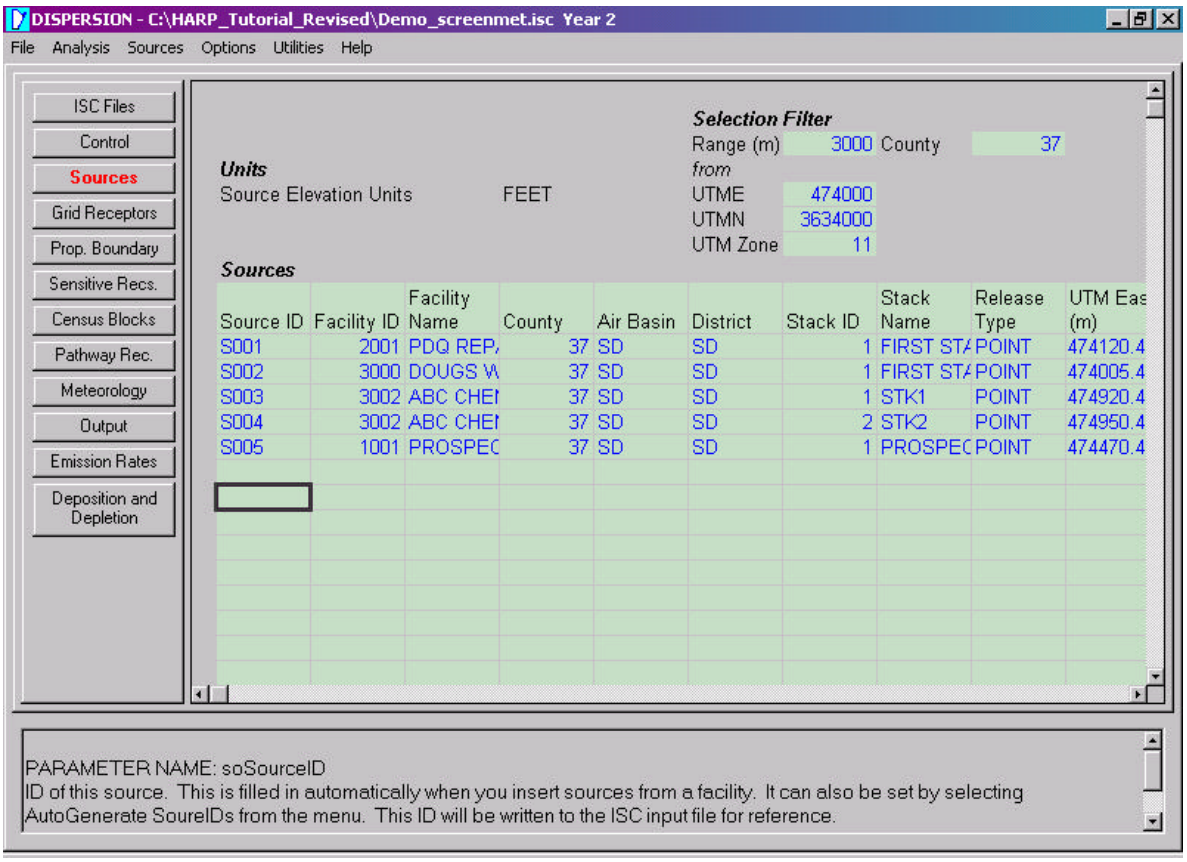
	missing data processing. Refer to section 3.2.2 in ISC User's Guide for more details.
Rural or Urban	Enter "RURAL" to use rural dispersion model, or "URBAN" to use the urban dispersion model.
Gradual Plume Rise	Enter Y to specify that the option of gradual plume rise will be used. Enter N to specify that gradual plume rise will not be used.
Stack tip downwash	Enter Y to specify use of stack tip downwash. Enter N to specify that no stack tip downwash will be used. Regulatory default is Y.
Buoyancy Induced Dispersion	Specifies the option to use no buoyancy induced dispersion (non-regulatory default). Regulatory default is Y.
Calms Processing	Enter Y to specify use of CALMS processing routines. Enter N to bypass CALMS processing routines. Regulatory default is Y. Refer to the next section for discussion of CALMS processing and risk analysis.
Missing Data Processing	Enter Y to specify use of missing data processing. Enter N to specify no missing data processing. Regulatory default is N.
Building Downwash	Enter Y if you want building downwash parameter on this sheet to be included in the ISC input file. Enter N if you want to skip building downwash calculations and ignore all data on this sheet.
Lowbound Option	Enter "Y" to use the non-regulatory LowBound option for building downwash. This option only applies if "Include building downwash?" is set to "Y", otherwise it is ignored.
Terrain Model	Enter SIMPLE to use simple terrain model only (suppress complex terrain calculations). Enter COMPLEX to use complex terrain model only (suppress simple terrain calculations). Enter BOTH to use both complex and simple terrain calculations.
Terrain Heights	Enter ELEVATED to specify that receptors may be located on elevated terrain. Enter FLAT to specify that flat terrain will be assumed for all calculations. If you enter ELEVATED then elevations must be specified for all receptors. Terrain Heights are entered as "flagpole heights" on four different categories listed under the dispersion worksheets for: grid receptors, property boundary receptors, sensitive receptors and census blocks.
Terrain Elevation Units	Units for terrain receptor elevations. Terrain receptor elevations must be in feet.
1-Hour	Specify that 1-hour average concentrations will be calculated.
3-Hour	Specify that 3-hour average concentrations will be calculated.
8-Hour	Specify that 8-hour average concentrations will be calculated.
24-Hour	Specify that 24-hour average concentrations will be calculated.
Monthly	Specify that monthly average concentrations will be calculated.

Period	Specify that average concentrations will be calculated for the entire simulation period.
Annual	Specify that annual average concentrations will be calculated.

9.12.3 Source Worksheet

The Sources worksheet is displayed when you select the *Sources* button from the left side of the workbook screen. This source worksheet is used to input descriptions of the emission sources. Section 9.12.3.1 provides an overview of setting up a list of sources. Section 9.12.3.3 describes each of the parameters on this worksheet.

When the source worksheet is displayed, the Sources menu item will also appear on the horizontal menu bar at the top of the screen. Under the Sources menu you will find several additional options for setting up the source descriptions on this worksheet. These are described in section 9.12.3.4.



9.12.3.1 Defining Sources (Source Worksheet)

Each source corresponds to a row in the Sources table on the Sources worksheet. Some of the parameters on this worksheet are for display purposes only and are not used by ISC. The parameters that are used by ISC are the Source ID, location (X, Y and Z), Emission Rate, and stack parameters (Height, Temperature, Velocity and Diameter). The remaining parameters are used to identify which facility a particular stack belongs to. These are filled in automatically when you select ***Sources/Insert Entire Facility*** from the menu (refer to section 9.12.3.4.1).

For the purpose of running ISC, all sources are associated with stacks. HARP provides functions under the Sources menu for retrieving stack data from the HARP database and inserting it onto this worksheet. You may then edit the data if you wish prior to using it to create the ISC input file. For details refer to section 9.12.3.4.

The Source ID can be any string of up to 8 characters. HARP will create Source IDs automatically when you select ***Sources/Auto-generate Source IDs*** from the menu (refer to section 9.12.3.4.5). You may also enter the source ID's manually.

When HARP builds the ISC input file, it reads the parameters that you provide on the Source worksheet and writes them to the ISC input file in the correct format. HARP reads the sources starting with the first row in the table and continuing downward until it encounters a row with a blank Source ID.

9.12.3.2 Removing Sources (Source Worksheet)

If a Source ID on the Sources worksheet is blank, then that source and any sources below it in the table are completely ignored. Therefore you may truncate the list of sources by simply deleting the source ID for one of the rows. Than all rows below that will be ignored. To set a source ID to blank, simply place the cursor on the cell containing the source ID and press the space bar and the Enter key. Another way to remove a source from the list is to use the ***Delete Rows*** menu option (refer to section 9.12.3.4.4).

9.12.3.3 Source Input Parameters (Source Worksheet)

Source Elevation Units	Elevation units. These units apply to values entered under the column labeled "Elevation" below. When you select *Source/Insert Entire Facility* from the menu, the program inserts values of source elevation from the database, which are always in units of feet. For consistency with the database, this cannot be changed.
(Selection Filter)	
Range	This range is used to select sources from the database and enter them automatically in the list below. When you select *Sources/Insert Sources Using Selection Filter* from the menu, the program locates all sources in the database which are within this range from the specified location and inserts them into the list. The sources shown in the list are then written to the ISC input file.

UTM East	UTM east coordinate of the origin of the facility of interest. To set this value automatically to the location of a particular facility, select *Sources/Selection Filter/Set Selection Filter to Origin of a Facility* from the menu.
UTM North	UTM north coordinate of the origin of the facility of interest. To set this value automatically to the location of a particular facility, select *Sources/Selection Filter/Set Selection Filter to Origin of a Facility* from the menu.
UTM Zone	UTM zone for this facility.
County	The is the county used to filter automatic selection of sources from the database. To set this value automatically to the location of a particular facility, select *Sources/Selection Filter/Set Selection Filter to Origin of a Facility* from the menu. If you type a name in this cell, only sources in this county will be selected and entered into the list.
(Sources)	
Source ID	ID of this source. It can be set by selecting *AutoGenerate SoucreIDs* from the menu or by entering a string manually. This ID will be written to the ISC input file for reference.
Facility ID	ID of the facility which contains this stack. This is for information only and is not used by ISC. However, it is important to HARP when doing risk analysis, because the facility ID, county, air basin and district are used to reference back to the database to look up emission rates. Facility ID is filled in automatically when you insert sources from a facility.
Facility Name	Name of the facility that contains this stack. This is for information only and is not used by ISC. This is filled in automatically when you insert sources from a facility.
County	County ID of the facility which contains this stack. This is filled in automatically when you insert sources from a facility.
Air Basin	Air basin ID of the facility which contains this stack. This is filled in automatically when you insert sources from a facility.
District	District ID of the facility which contains this stack. This is filled in automatically when you insert sources from a facility.
Stack ID	Stack ID of this stack in the HARP database. This is filled in automatically when you insert sources from a facility.
Stack Name	Name of this stack in the CEIDARS database. This is for information only and is not used by ISC. This is filled in automatically when you insert sources from a facility.
Release Type	This is the release type as defined in the HARP database for this stack. It can be either POINT, VOLUME, AREA or PITVOL. An

	open pit source (PITVOL) requires the use of deposition (see section 9.12.12.1). This in turn requires the use of a meteorology file that includes surface roughness. An example is the file DEPTEST.MET that is included with ISC (a copy is installed with HARP).
UTM East	UTM east coordinate of this source. When you select *Sources/Insert Entire Facility* from the menu, the program will insert a source entry in this table for each stack in the facility and will automatically insert the correct UTM coordinates from the database.
UTM North	UTM north coordinate of this source. When you select *Sources/Insert Entire Facility* from the menu, the program will insert a source entry in this table for each stack in the facility and will automatically insert the correct UTM coordinates from the database.
Elevation	Elevation of the base of the stack.. When you select *Sources/Insert Entire Facility* from the menu, the program will insert a source entry in this table for each stack in the facility and will automatically insert the stack elevations from the database. When you insert sources from the database, the units are always feet.
Emission Rate	Emission rate is normally set to 1.0. This produces an ISC output file which contains the X/Q factors for use in the risk assessment. You may manually override the default value of 1.0 by entering specific emission rates in this column.
Release Height	Height of the stack. When you select *Sources/Insert Entire Facility* from the menu, the program will insert the stack height from the database.
Temperature	Temperature of the gases output from this stack. When you select *Sources/Insert Entire Facility* from the menu, the program will insert a value from the database.
Velocity	Output velocity from the stack. When you select *Sources/Insert Entire Facility* from the menu, the program will insert a value from the database.
Stack Diameter	Diameter of the stack. When you select *Sources/Insert Entire Facility* from the menu, the program will insert a value from the database.
SYINIT	Width of volume source. Refer to ISC manual, Volume II, Table 1-6.
SZINIT	Height of volume or area source. Refer to ISC manual, Volume II, Table 1-6.
XINIT	X-width of area or pit volume source. Refer to ISC manual.

YINIT	Y-width of area or pit volume source. Refer to ISC manual.
ANGLE	Orientation angle of area or pit volume source. Refer to ISC manual.
VOLUME	Volume of pit volume source. Refer to ISC manual.
UTM Zone	UTM zone of this source. When you select *Sources/Insert Entire Facility* from the menu, the program will insert a source entry in this table for each stack in the facility and will automatically insert the correct UTM zone from the database.

9.12.3.4 Source Menu Options

9.12.3.4.1 Insert Entire Facility (Source Worksheet)

The *Insert Entire Facility* menu option is used to populate the Sources worksheet with data from the database. If you are working with a database that already contains stack data for the facility being analyzed, this function reduces the work of setting up the dispersion analysis by gathering the source parameters from the database and placing it on the worksheet automatically. No manual reentry of source parameters is required.

Before selecting this menu option place the cursor anywhere on the row in the table where you want to insert a series of sources from a facility. Then select ***Source/Insert Entire Facility*** from the menu. The program will prompt you with a list of facilities in the database. Select one of the facilities and press ***OK***. Everything else is automatic. The program will first determine how many stacks there are in the selected facility. It will then insert that number of rows in the table, starting at the row you have selected. It will then fill in all source parameters in the table for each stack belonging to that facility.

The only item not filled in by the program at this point is the source ID for each stack. You can make up a source ID of your own choosing for each stack, or you can have the program generate source ID's for you by selecting ***Auto-generate Source IDs*** from the menu (see below).

9.12.3.4.2 Selection Filter (Source Worksheet)

The selection filter specifies a range of sources that you want to insert from the database into the table. The first step is to enter the UTM coordinates you are interested in. You can do this by either typing in the UTM coordinates or by centering the analysis on a facility of interest. You would do this by choosing ***Sources/Selection Filter/Set selection filter origin to a facility location***. HARP will automatically fill in the UTM coordinates and the County number. Next you would fill in a distance for the range. The range indicates that you want HARP to insert all sources within a specified distance of these UTM coordinates. The final step will to select from the menu ***Sources/Insert Sources Using Selection Filter***. HARP will then insert all of the sources in the database that are within the specified range of the UTM coordinates.

9.12.3.4.3 Insert Rows (Source Worksheet)

Use this menu option to insert an empty row or multiple rows in the source parameter table on the Sources worksheet. First place the cursor anywhere on the row where you want to insert an empty row. If you want to insert multiple rows, place the cursor on the row where you want the empty rows to be inserted, and drag the mouse downward to select how many rows you want to insert. Then select ***Insert Rows*** from the menu. If you want to delete rows from the table, select ***Sources/Delete Rows*** (see below)

9.12.3.4.4 Delete Rows (Source Worksheet)

This menu option is used to delete entire rows from the sources table on the Sources worksheet. First place the cursor on the row that you want to delete. If you want to delete multiple rows, place the cursor on the first row that you want to delete and drag the mouse downward to select how many rows you want to delete. Then select ***Source/Delete Rows*** from the menu.

9.12.3.4.5 Auto-generate Source IDs (Source Worksheet)

When you create a new row in the sources worksheet, either by selecting ***Insert Entire Facility*** or ***Insert Row(s)***, the Source IDs are not automatically created. Each source (stack) must have a corresponding ID on the sources worksheet. If you wish, you may provide these IDs by simply entering any string of up to 8 characters under the Source ID column for each stack. This may be desirable if you want the IDs to be some meaningful descriptors that you invent.

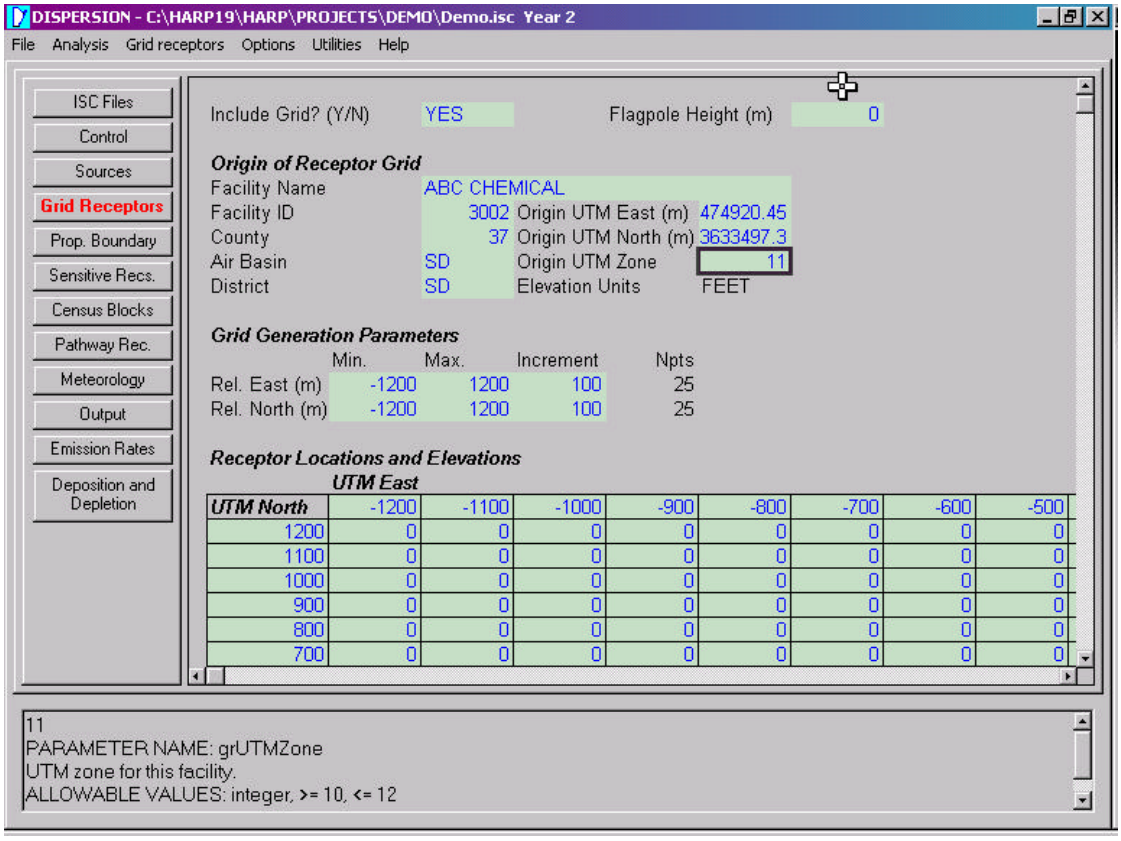
Another way to create source IDs is to use the auto-generate function as follows. First highlight the rows for which you want to create new IDs automatically. To do this, place the cursor on any row and drag the mouse downward to select the rows for which you want to generate IDs. Then select ***Auto-generate Source IDs*** from the menu. The program will create source IDs based on the row numbers and place the IDs in the correct cells on the worksheet. The source IDs that HARP generates are sequentially numbered based on the row in the table. If you edit the source IDs, you are responsible for making sure that each source ID is unique.

9.12.3.4.6 Fill in elevations (Source Worksheet)

If you have loaded DEM data, then this function will fill in the elevations for each of the sources on this worksheet. Refer to section 9.13.

9.12.4 Grid Receptors Worksheet

The Grid Receptors worksheet is used to describe the locations of receptors that are placed on a Cartesian grid. Section 9.12.4.1 describes each of the parameters on this worksheet.



9.12.4.1 Grid Receptor Parameters (Grid Receptors Worksheet)

Include Grid — Enter Y if you want cartesian grid receptors to be included in the ISC input file. Enter N if you do not want to include the cartesian grid receptors shown on this worksheet.

Flagpole height — The flagpole height (meters) for all property boundary receptors. See section 9.12.4.5 for more information.

(Origin of Receptor Grid)

Facility Name — Name of the facility which represents the location of this receptor grid. When you select *Grid Receptors/Set Origin to Facility* from the menu, the facility name and location are filled in automatically by the program. You may edit the name for your own reference, but this will have no effect on the ISC input file. Only the location is important.

Facility ID — ID of the facility which represents the location of this receptor grid. When you select *Grid Receptors/Set Origin to Facility* from the menu, the facility name and location are filled in automatically by the program. You may edit the ID for your own reference, but this will have no effect on the ISC input file. Only the location is important.

County	County ID of the facility which represents the location of this receptor grid. When you select *Grid Receptors/Set Origin to Facility* from the menu, the facility name and location are filled in automatically by the program. For the purpose of running ISC, only the location is important. The other parameters in this section are for reference only.
Air Basin	Air basin ID of the facility which represents the location of this receptor grid. When you select *Grid Receptors/Set Origin to Facility* from the menu, the facility name and location are filled in automatically by the program. For the purpose of running ISC, only the location is important. The other parameters in this section are for reference only.
District	District ID of the facility which represents the location of this receptor grid. When you select *Grid Receptors/Set Origin to Facility* from the menu, the facility name and location are filled in automatically by the program. For the purpose of running ISC, only the location is important. The other parameters in this section are for reference only.
UTM East	UTM east coordinate of the origin of the receptor grid. To set this value automatically to the location of a particular facility, select *Grid receptors/Set Origin to Facility* from the menu. The individual receptor grid points are determined by adding the UTM coordinates of the facility shown here to the relative UTM East and UTM North coordinates shown in the matrix below.
UTM North	UTM north coordinate of the origin of the receptor grid. To set this value automatically to the location of a particular facility, select *Grid Receptors/Set Origin to Facility* from the menu. The individual receptor grid points are determined by adding the UTM coordinates of the facility shown here to the relative UTM East and UTM North coordinates shown in the matrix below.
UTM Zone	UTM zone for this facility.

(Grid Generation Parameters)

Min	This is the minimum relative receptor x location used for automatic grid generation. To generate a receptor grid using the values in this section, select *Grid Receptors/Generate Grid* from the menu. This will cause the matrix below to be filled in with x and y locations according to the grid generation parameters.
Max	This is the maximum relative receptor x location used for automatic grid generation. To generate a receptor grid using the values in this section, select *Grid Receptors/Generate Grid* from the menu. This will cause the matrix below to be filled in with x and y locations according to the grid generation parameters.

Increment	This is the incremental spacing of the receptors in the x direction for automatic grid generation. To generate a receptor grid using the values in this section, select *Grid Receptors/Generate Grid* from the menu. This will cause the matrix below to be filled in with x and y locations according to the grid generation parameters.
Npts	This cell tells how many points there will be along the east and north directions of the grid respectively using the Max, Min and Increment values which you specify.

(Receptor Elevations Matrix)

UTM East	Relative UTM east coordinate of this north-south grid line. The absolute grid location is determined by adding this relative location to the facility location shown above.
UTM North	UTM north coordinate of this east-west grid line. The absolute grid location is determined by adding this relative location to the facility location shown above.
Elevation	Elevation of this grid point in units of FEET. The location of this grid point relative to the facility is given by the relative UTM East and UTM North coordinates which are shown on the top row and left column of this matrix. The elevations can be set automatically if you have DEM data (refer to section 9.13).

9.12.4.2 Defining a Cartesian Receptor Grid (Grid Receptors Worksheet)

Cartesian receptor grids are used to compute the concentration of pollutants over a rectangular geographical region, usually in the vicinity of a particular facility, for the purpose of creating concentration contours and performing risk assessment.

To define a Cartesian receptor grid you must first provide the location and elevation of every receptor on the grid in the table labeled *Receptor Locations and Elevations*. The *Receptor Locations and Elevations table* is a matrix showing the UTM East coordinate on the top row, the UTM North coordinate on the left column, and the elevations of each of the corresponding receptors in the matrix.

The receptor grid coordinates defined on the worksheet are relative to the coordinate system origin. The location of the coordinate system origin is defined by the values in the cells labeled *Origin UTM East* and *Origin UTM North.* You may set these to zero if you want all receptor coordinates to be expressed in actual UTM coordinates. However, it is normally more convenient to define a receptor grid location with respect to some facility being analyzed. Therefore the values of *Origin UTM East* and *Origin UTM North* should normally be set to the location of a facility. If a facility is already defined in the database, its location can be determined automatically by selecting ***Grid Receptors/Set Origin to Facility*** from the menu (refer to section 9.12.4.3.1).

If the spacing of receptors is uniform in both the East and North directions, HARP will generate the East and North coordinates of all receptors automatically for you. To do this you must first set the parameters in the box labeled *Grid Generation Parameters* and then select ***Grid Receptors/Generate Grid*** from the menu (refer to section 9.12.4.3.2).

9.12.4.3 Grid Receptor Menu

9.12.4.3.1 Set Origin to Facility (Grid Receptors Worksheet)

The *Set Origin to Facility* menu option sets the coordinates of the origin of the receptor grid to the location of a specific facility defined in the database. A Cartesian receptor grid is defined by the UTM coordinates shown in the table labeled *Receptor Locations and Elevations* on the Grid Receptors worksheet. These coordinates are all relative to the coordinate system origin, which is defined in the box labeled *Origin of Receptor Grid*. You may set the origin to any location by entering values in the cells labeled *Origin UTM East* and *Origin UTM North.* Alternatively, you may set the origin coordinates to be the location of a facility by selecting *Grid Receptors/Set Origin to Facility* from the menu. When you do this you will be prompted with a list of facilities defined in the database. Select one of the facilities from the list and press ***OK***. The program will then fill in the coordinates of that facility. The facility name, ID, county, air basin and district are also filled in on the worksheet, but these are for information only and are not used by ISC.

9.12.4.3.2 Generate Grid (Grid Receptors Worksheet)

The *Generate Grid* menu option fills in the grid receptor coordinates for the entire grid by using the parameters that you specify in the box labeled *Grid Generation Parameters* on the Grid Receptors worksheet. First specify the Min., Max., and Increment for both the east and north coordinates. Then select ***Grid Receptors/Generate Grid*** from the menu. The program will then set the UTM East and UTM North coordinates of each of the grid receptors starting with the minimum value that you have specified and incrementing by the increment value that you specify until the maximum value is reached. The grid receptor coordinates are defined in the top row and left column of the table labeled *Receptor Locations and Elevations*. The grid receptor coordinates can also be edited manually if you want non-uniform spacing.

9.12.4.3.3 Fill in Selected Elevation Range (Grid Receptors Worksheet)

The *Fill in Selected Elevation Range* menu option is used to set the elevations of a range of grid receptors to a specified value. This reduces the amount of redundant data entry for grids where a portion of the grid is flat terrain.

The elevations of all grid receptors are shown on the table labeled *Receptor Locations and Elevations* on the Grid Receptors worksheet. Each cell in the table contains the elevation of an individual grid receptor. The UTM East and UTM North coordinates of each receptor are shown in the top row and left column of the table respectively. You can set the elevation of any receptor by moving to the corresponding cell and entering a new value.

To fill in a range of receptors with the same elevation, first highlight the corresponding cells in the Receptor Locations and Elevations table by dragging the mouse across the cells. Then select ***Grid Receptors/Fill Selected Elevation Range*** from the menu. You will be prompted for the new elevation. The program will then fill in the selected range of cells with the value you specify. (See also section 9.13.)

9.12.4.3.4 Clear Selected Elevation Range (Grid Receptors Worksheet)

This menu option is used to clear the elevation cells for a selected range of grid receptors. First highlight the corresponding cells in the Receptor Locations and Elevations table by dragging the mouse across the cells. Then select ***Grid Receptors/Clear Selected Elevation Range*** from the menu. Clearing cells has little effect, other than to make the worksheet more readable by eliminating cells which are outside the range of the grid. If you clear cells within the range of the receptor grid, this is the same as setting their elevations to zero.

9.12.4.3.5 Fill in Elevations (Grid Receptors Worksheet)

If you have loaded DEM data, then this function will fill-in the elevations for each of the receptors on this worksheet. Refer to section 9.13.

9.12.4.4 Removing Grid Receptors (Grid Receptors Worksheet)

When HARP builds the ISC input file, it reads the parameters that you provide on the Grid Receptors worksheet and writes them to the ISC input file in the correct format. HARP reads the UTM East locations of the receptors starting at the left end of the top row and moving right until it encounters a blank cell. If a UTM East coordinate is blank, then that column and all columns to the right of it are completely ignored. HARP reads the UTM North locations of the receptors starting at the top end of the left column and moving down until it encounters a blank cell. If a UTM North coordinate is blank, then that row and all rows to the right of it are completely ignored. To reduce the number of receptors in the grid you can set the UTM East or UTM North coordinates of a particular row or column to blank, thereby eliminating all higher rows or columns from the grid.

To make it easier to read the grid, you can set elevations to blank for unused receptors. To do this select ***Grid Receptors/Clear Selected Elevation Range*** from the menu (refer to section 9.12.4.3.4).

If you want to completely eliminate the receptor grid from the ISC input file, simply set the parameter labeled *Include Grid* at the top of the worksheet to “N”.

9.12.4.5 Flagpole Height (Grid Receptors Worksheet)

Flagpole receptors are sometimes used to estimate impacts above ground level such as for a high-rise building or a tracer study. In addition, the user can input elevated receptor heights in order to model the effects of terrain above (or below) stack base. For simple terrain calculations, any terrain heights input above the release height for a particular source are "chopped-off" at the

release height for that source's calculations. For more information on flagpole height see the *User's Guide for the Industrial Source Complex (ISC) Dispersion Models.*

9.12.5 Property Boundary Receptors Worksheet

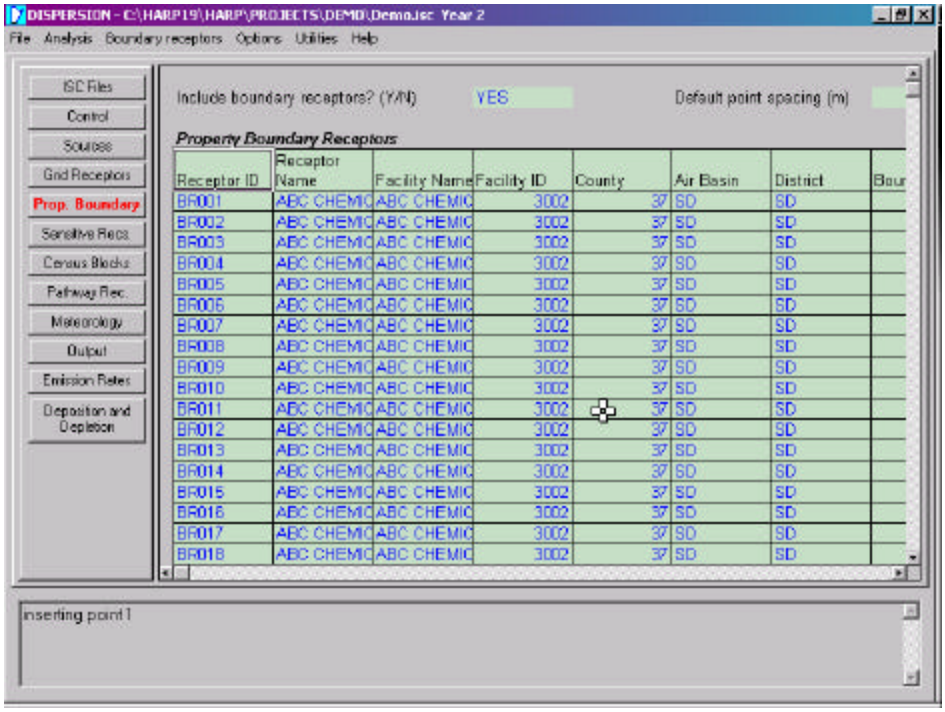
The Property Boundary Receptor worksheet is used to describe the locations of receptors on a facility property boundary. Section 9.12.5.1 provides an overview of setting up property boundary receptors. Section 9.12.5.2 describes each of the parameters on this worksheet.

9.12.5.1 Defining Property Boundary Receptors (Property Boundary Worksheet)

Property boundary receptors are used to compute the concentration of pollutants along the property boundary of a facility for the purpose of determining the location of the maximum exposed individual (MEI).

Each property boundary receptor corresponds to a row in the table on the Boundary Receptors worksheet. Some of the parameters on this worksheet are for display purposes only and are not used by ISC. The parameters that are used by ISC are the Receptor ID, location (UTM East and UTM North) and elevation. The remaining parameters are used to identify the facility and property boundary on which each receptor lies.

You may fill in all or part of the table with data from the database by selecting ***Boundary Receptors/Insert Facility Boundary Receptors*** from the menu. This causes the program to search the database for property boundaries for a selected facility, calculate coordinates of receptors along those boundaries, and insert parameters for these receptors in the table (refer to section 9.12.5.3.1).



9.12.5.2 Property Boundary Receptor Parameters (Property Boundary Worksheet)

Include Boundary Receptors	Enter Y if you want property boundary receptors to be included in the ISC input file. Enter N if you do not want to include the property boundary receptors shown on this worksheet.
Default Point Spacing	Spacing of receptors along the facility property boundary. This number is used when you select *Boundary Receptors/Insert Facility Boundary Receptors* from the menu. The program then retrieves the property boundary geometry from the database for the selected facility and generates receptors along the boundary at this interval.
Flagpole Height	The flagpole height (meters) for all property boundary receptors. See section 9.12.4.5 for more information.
Receptor ID	This ID will be written to the ISC input file as a comment only for your reference. These IDs are filled-in automatically by the program when you select *Boundary Receptors/Insert Facility Boundary Receptors* from the database.
Receptor Name	This name will be written to the ISC input file as a comment only for your reference. These names are filled in automatically by the program when you select *Boundary Receptors/Insert Facility Boundary Receptors* from the database. You may also edit them to provide your own identification of the receptors.
Facility Name	The name of the facility to which this receptor boundary belongs. This is filled in automatically when you select *Boundary Receptors/Insert Facility Boundary Receptors* from the menu.
Facility ID	The ID of the facility to which this receptor belongs. This is filled in automatically when you select *Boundary Receptors/Insert Facility Boundary Receptors* from the menu.
County	The ID of the county containing this facilty. This is filled in automatically when you select *Boundary Receptors/Insert Facility Boundary Receptors* from the menu.
Air Basin	The ID of the air basin containing this facility. This is filled in automatically when you select *Boundary Receptors/Insert Facility Boundary Receptors* from the menu.
District	The ID of the air district containing this facility. This is filled in automatically when you select *Boundary Receptors/Insert Facility Boundary Receptors* from the menu.
Boundary Number	The ID of the boundary curve to which this receptor belongs. A facility boundary may be composed of one or more closed curves, each of which has its own ID. This is filled in automatically when you select *Boundary Receptors/Insert Facility Boundary Receptors* from the menu.

UTM East	UTM east coordinate of this property boundary receptor. This is filled in automatically by the program when you select *Boundary Receptors/Insert Facility Boundary Receptors* from the menu. You may also edit this value directly on the worksheet.
UTM North	UTM north coordinate of this property boundary receptor. This is filled in automatically by the program when you select *Boundary Receptors/Insert Facility Boundary Receptors* from the menu. You may also edit this value directly on the worksheet.
Elevation	Elevation of this property boundary receptor. You may also edit this value directly on the worksheet or you can fill in the values automatically if you have DEM data. (see also section 9.13)

9.12.5.3 Property Boundary Receptors Menu (Property Boundary Worksheet)

9.12.5.3.1 Insert Facility Property Boundary Receptors

This menu option is used to populate the Property Boundary Receptors worksheet with data from the database. If you are working with a database that contains property boundary data for the facility being analyzed, this function reduces the work of setting-up the dispersion analysis by automatically generating receptors along the boundary.

Before selecting this menu option you must enter a value for *Default Spacing* on the Boundary Receptor worksheet. This is the distance in meters between adjacent receptors along the boundary. Next place the cursor anywhere on the row in the table where you want to insert a series of property boundary receptors. Typically this will be either the first row of the table or the first empty row at the bottom of the table. Then select ***Source/Insert Facility Property Boundary Receptors*** from the menu. The program will prompt you with a list of facilities in the database. Select one of the facilities and press ***OK***. Everything else is automatic. The program will determine the locations of all property boundaries for the selected facility and will calculate the X and Y coordinates of a series of evenly spaced receptors along the boundary. It will then insert the correct number of rows in the table, starting at the row you have selected and fill in all parameters for the new receptors.

9.12.5.3.2 Delete Rows (Property Boundary Worksheet))

This menu option is used to delete entire rows from the Property Boundary Receptors table on the Property Boundary Receptors worksheet. First place the cursor on the row that you want to delete. If you want to delete multiple rows, place the cursor on the first row that you want to delete and drag the mouse downward to select how many rows you want to delete. Then select ***Source/Delete Selected Receptor(s)*** from the menu.

9.12.5.3.3 Fill in Elevations (Property Boundary Worksheet)

If you have loaded DEM data, then this function will fill in the elevations for each of the receptors on this worksheet. Refer to section 9.13.

9.12.6 Sensitive Receptors Worksheet

The Sensitive Receptors worksheet is used to describe the locations of sensitive receptors. Section 9.12.6.1 provides an overview of setting up a list of sensitive receptors. Section 9.12.6.2 describes each of the parameters on this worksheet.

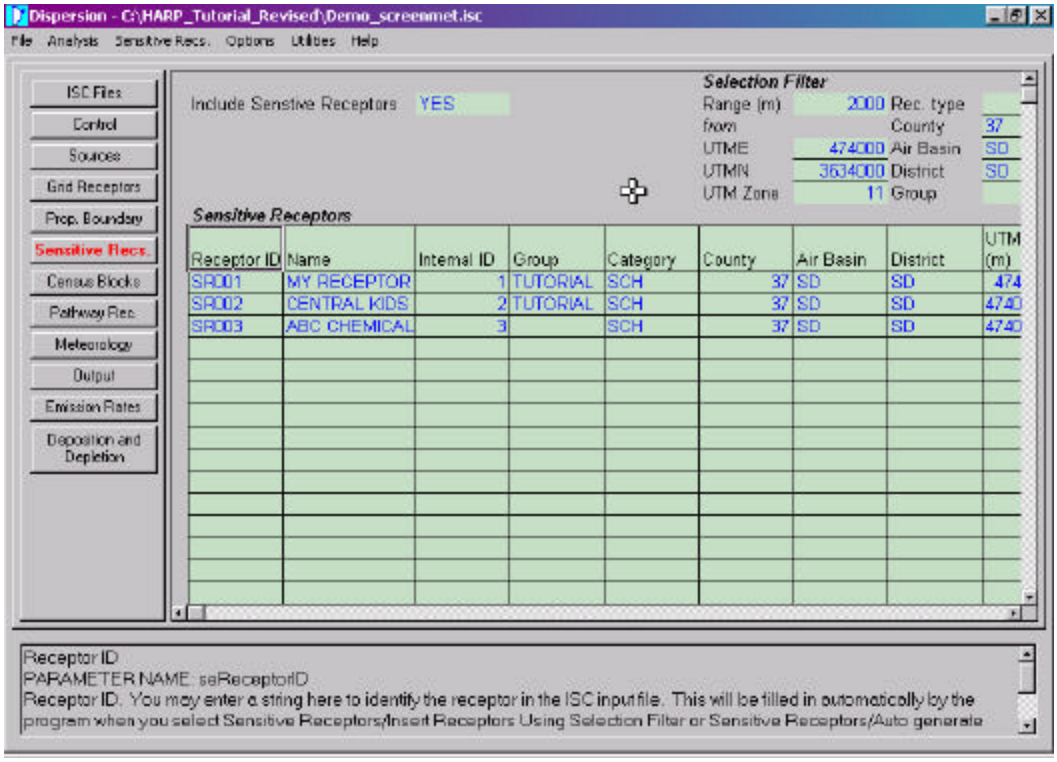
9.12.6.1 Defining Sensitive Receptors (Sensitive Receptors Worksheet)

Sensitive receptors are used to compute the concentrations of pollutants at specific locations that usually represent some small sensitive population concentration such as a school or hospital.

Each sensitive receptor corresponds to a row in the Sensitive Receptors table on the Sensitive Receptors worksheet. Some of the parameters on this worksheet are for display purposes only and are not used by ISC. The parameters that are used by ISC are the Receptor ID, location (UTM East and UTM North) and elevation. The residential and working populations are not used in the dispersion analysis, but will be used by the risk analysis module. The remaining parameters are used to identify each sensitive receptor in the database.

You may fill in all or part of the table with data from the database by selecting ***Sensitive Receptors/Insert Receptors Using Selection Filter*** from the menu. This causes the program to search the database for sensitive receptors which meet the criteria specified in the box labeled *Selection Filter*, and insert parameters for these receptors in the table (refer to section 9.12.6.3.1).

The Receptor ID can be any character string up to 8 characters. For convenience, HARP will create Receptor IDs automatically when you insert sensitive receptors from the database by selecting ***Sensitive Receptors/Insert Receptors Using Selection Filter*** from the menu. You may also create receptor IDs by selecting ***Sensitive Receptors/Auto-generate Receptor IDs*** (refer to section 9.12.6.3.5).



9.12.6.2 Sensitive Receptors Parameters (Sensitive Receptors Worksheet)

Include Sensitive Receptors — Enter Y if you want these sensitive receptors to be included in the ISC input file. Enter N if you do not want to include sensitive receptors.

(Selection Filter)

Range — This range is used to select sensitive receptors from the database and enter them automatically in the list below. When you select *Sensitive Receptors/Insert Receptors Using Selection Filter* from the menu, the program locates all sensitive receptors in the database which are within this range from the specified location and inserts them into the list. The receptors shown in the list are then written to the ISC input file.

UTM East — This is the UTM east coordinate of the center of the coordinate system for sensitive receptor selection. See the description of range above.

UTM North — This is the UTM north coordinate of the center of the coordinate system for sensitive receptor selection. See the description of range above.

Zone — This is the UTM zone of the center of the coordinate system for sensitive receptor selection. See the description of range above.

Category	The is the receptor type used to filter automatic selection of sensitive receptors from the database. To enter a value here, select *Sensitive Receptors/Selection Filter/Select Receptor Type* from the menu. If you provide a type in this cell, only receptors of this type will be selected and entered into the list.
County	The is the county used to filter automatic selection of sensitive receptors from the database. To enter a value here, select *Sensitive Receptors/Selection Filter/Select County/Air Basin/District* from the menu. If you provide a type in this cell, only receptors in this county will be selected and entered into the list.
Air Basin	The is the air basin used to filter automatic selection of sensitive receptors from the database. To enter a value here, select *Sensitive Receptors/Selection Filter/ Select County/Air Basin/District* from the menu. If you provide a type in this cell, only receptors in this air basin will be selected and entered into the list.
District	The is the district used to filter automatic selection of sensitive receptors from the database. To enter a value here, select *Sensitive Receptors/Selection Filter/ Select County/Air Basin/District* from the menu. If you provide a type in this cell, only receptors in this district will be selected and entered into the list.
Flagpole Height	The flagpole height (meters) for all property sensitive receptors. See section 9.12.4.5 for more information.
(Sensitive Receptors)	
Receptor ID	Receptor ID. You may enter a string here to identify the receptor in the ISC input file. This will be filled in automatically by the program when you select ***Sensitive Receptors/Insert Receptors Using Selection Filter or Sensitive Receptors/Auto generate Receptor IDs*** from the menu.
Name	Receptor name.
Internal ID	The ID of this receptor which identifies it in the database. This is displayed here for your information only when you insert receptors into the list by selecting ***Sensitive Receptors/Insert Receptors Using Selection Filter*** from the menu.
Category	Receptor category.
County	ID of county containing this receptor.
Air Basin	ID of air basin containing this receptor.
District	ID of district containing this air basin.
UTM East	UTM east coordinate of this receptor.
UTM North	UTM north coordinate of this receptor.
Elevation	Elevation of this receptor.

Residential Population	Residential population. Reserved for future use for cancer burden calculations.
Working Population	Residential population. Reserved for future use for cancer burden calculations.

9.12.6.3 Sensitive Receptors Menu

9.12.6.3.1 Selection Filter (Sensitive Receptors Worksheet)

You may fill in all or part of the sensitive receptor table with data from the database by selecting ***Sensitive Receptors/Insert Receptors Using Selection Filter*** from the menu. This causes the program to search the database for sensitive receptors which meet the criteria specified in the box labeled Selection Filter, and insert parameters for those receptors into the table (refer to section 9.12.6.3.2).

Three criteria are applied when selecting sensitive receptors from the database. The first criterion is that each selected receptor must lie within a specified range (determined by the Range parameter on the worksheet) from a specified location (determined by the selection filter UTM coordinates specified on the worksheet). You can use the ***Sensitive Receptors/Selection Filter/Set Selection Filter Origin to Facility Location*** option to insert the coordinates of a facility into the Selection Filter box. This makes is easy to include all receptors within a specified distance of a particular facility. The second criterion is that each selected receptor must lie within the county, air basin and district specified in the selection filter box. The third criterion is that each selected receptor must be of the type specified in the Category parameter in the selection filter box. If any of these criteria is left blank, then it is ignored when conducting the search. The search is actually started when you select ***Sensitive Receptors/Insert Receptors Using Selection Filter*** (refer to section 9.12.6.3.2).

To make it easier to setup the Selection Filter, three menu items appear under the ***Selection Filter*** menu. These are as follows.

Receptor Type	This allows you to change the Category filter parameter by selecting one of the allowable receptor types from a list.
County/Air Basin/ District	This allows you to change the county, air basin, and district filter parameters by selecting from a list.
Facility Location	This allows you to update the UTM coordinates in the Selection Filter with the location of a facility by selecting the facility name from a list.

9.12.6.3.2 Insert Receptors Using Selection Filter (Sensitive Receptors Worksheet)

This menu option appears under the *Sensitive Receptors* menu when the sensitive receptors worksheet is displayed. This causes the program to search the database for sensitive

receptors which meet the criteria specified in the box labeled Selection Filter, and insert parameters for those receptors into the table sensitive receptors table.

9.12.6.3.3 Insert Single Receptor (Sensitive Receptors Worksheet)

This menu option allows you to insert a single sensitive receptor from the database into the sensitive receptor list on the Sensitive Receptor worksheet. First place the cursor anywhere on the row where you want to insert the receptor. Then select ***Sensitive Receptors/Insert Single Receptor*** from the menu. You will be prompted with a list of all of the sensitive receptors in the database. Select the receptor you want to insert and press ***OK***. The program will then insert a blank row in the sensitive receptors table and fill in the parameters with information from the database.

9.12.6.3.4 Delete Rows (Sensitive Receptors Worksheet)

This menu option is used to delete entire rows from the sensitive receptors table on the Sensitive Receptors worksheet. First place the cursor on the row that you want to delete. If you want to delete multiple rows, place the cursor on the first row that you want to delete and drag the mouse downward to select how many rows you want to delete. Then select ***Sensitive Receptors/Delete Rows*** from the menu.

9.12.6.3.5 Auto-generate Receptor IDs (Sensitive Receptors Worksheet)

When you create a new row in the Sensitive Receptors worksheet, either by selecting ***Insert Receptors Using Selection Filter*** (refer to section 9.12.6.3.2) or by selecting ***Insert Single Receptor*** (refer to section 9.12.6.3.3), the Receptor IDs are not automatically created. Each receptor must have a corresponding ID on the sensitive receptors worksheet. If you wish, you may provide these IDs by simply entering any string of up to 8 characters under the Receptor ID column for each sensitive receptor. This may be desirable if you want the IDs to be some meaningful descriptors that you invent. Another way to create Receptor IDs is to use the auto-generate function.

First highlight the rows for which you want to create new Ids automatically. To do this, place the cursor on any row of your choosing and drag the mouse downward to select the rows for which you want to generate IDs. Then select ***Auto-generate Receptor IDs*** from the menu. The program will create Receptor IDs based on the row numbers and place the IDs in the correct cells on the worksheet.

9.12.6.3.6 Fill in Elevations (Sensitive Receptors Worksheet)

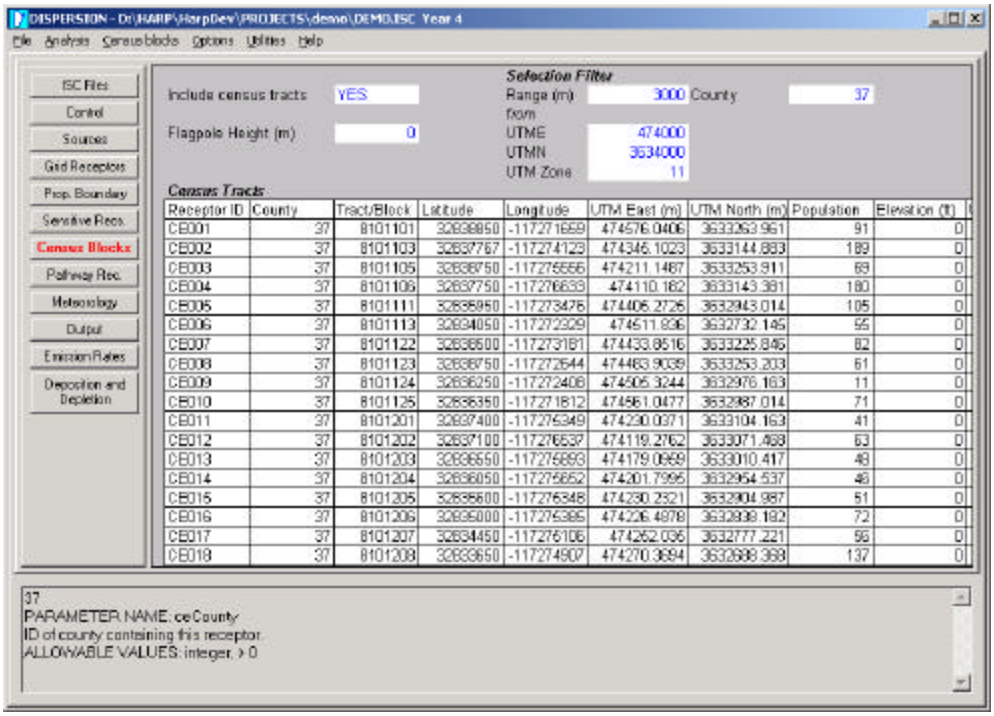
If you have loaded DEM data, then this function will fill in the elevations for each of the receptors on this worksheet. Refer to section 9.13.

9.12.6.4 Removing Sensitive Receptors (Sensitive Receptors Worksheet)

When HARP builds the ISC input file, it reads the parameters that you provide on the Sensitive Receptor worksheet and writes them to the ISC input file in the correct format. HARP reads the receptor data starting with the first row in the table and continuing downward until it encounters a row with a blank Receptor ID. If a Receptor ID is blank, then that receptor and any receptors below it in the table are completely ignored. To set a receptor ID to blank, simply place the cursor on the cell containing the receptor ID; press the space bar and the *Enter* key. HARP considers empty cells and cells containing blank spaces to be the same. Another way to remove a receptor from the list is to use the ***Delete Rows*** menu option (refer to section 9.12.6.3.4).

9.12.7 Census Blocks Worksheet

The Census Blocks worksheet is used to describe the locations of census block receptors. Section 9.12.7.1 provides an overview of setting up a list of census block receptors. Section 9.12.7.2 describes each of the parameters on this worksheet.



9.12.7.1 Defining Census Block Receptors (Census Blocks Worksheet)

Census block receptors are used to compute the concentrations of pollutants at census block reference locations for the purpose of computing cancer burden.

To define a list of census block receptors you must provide the location, elevation and population of each census block receptor in the table. Since the database already contains census block location and population data, menu options have been provided to populate this table automatically if you wish.

Each census block receptor corresponds to a row in the Census Blocks table on the Census Blocks worksheet. Some of the parameters on this worksheet are for display purposes only and are not used by ISC. The parameters that are used by ISC are the Receptor ID, location (UTM East and UTM North) and elevation. The population are not used in the dispersion analysis, but will be used by the risk analysis module. The remaining parameters are used to identify each census block for your reference only.

You may fill in all or part of the table with data from the database by selecting ***Census Blocks/Insert Receptors Using Selection Filter*** from the menu. This causes the program to search the database for census blocks which meet the criteria specified in the box labeled Selection Filter, and insert receptors corresponding to these census blocks into the table (refer to section 9.12.7.3.1).

The Receptor ID can be any character string up to 8 characters. For convenience, HARP will create Receptor IDs automatically when you insert census block receptors from the database by selecting ***Census Blocks/Insert Receptors Using Selection Filter*** from the menu. You may also create receptor IDs by selecting ***Census Blocks/Auto-generate Receptor IDs*** (refer to section 9.12.7.3.4).

9.12.7.2 Census Blocks Parameters (Census Blocks Worksheet)

Include Census Blocks	Enter Y if you want census block receptors to be included in the ISC input fle. Enter N if you do not want census block receptors
Flagpole Height	The flagpole height (meters) for all census block receptors. See section 9.12.4.5 for more information.
Range	Range for census block selection
UTM East	UTM east coordinate of center of range for census block selection
UTM North	UTM north coordinate of center of range for census block selection
UTM Zone	UTM zone of center of range for census block selection.
County	County for census block selection.
(Census Blocks)	
Receptor ID	Receptor ID.
County	ID of county containing this receptor.
Tract/Block	This is a code number filled in by HARP to identify the tract and block of the receptor. The right-most three digits of the number are the block number. The other digits to the left are the tract number.

Latitude	The latitude of the reference point for this census block. This is filled in automatically by the program when you select *Census Blocks/Insert County* from the menu.
Longitude	The longitude of the reference point for this census block. This is filled in automatically by the program when you select *Census Blocks/Insert County* from the menu.
UTM East	The UTM east coordinate of the reference point for this census block. This is filled in automatically by the program when you select *Census Blocks/Insert County* from the menu.
UTM North	The UTM east coordinate of the reference point for this census block. This is filled in automatically by the program when you select *Census Blocks/Insert County* from the menu.
Population	The residential population at this receptor.
Elevation	The elevation of this receptor.

9.12.7.3 Census Blocks Menu

9.12.7.3.1 Selection Filter (Census Blocks Worksheet)

You may fill in all or part of the table with data from the database by selecting ***Census Blocks/Insert Receptors Using Selection Filter*** from the menu. This causes the program to search the database for census blocks which meet the criteria specified in the box labeled Selection Filter, and insert receptors corresponding to these census blocks into the table (refer to section 9.12.7.3.2).

Two criteria are applied when selecting census receptors from the database. The first criterion is that each selected receptor must lie within a specified range (determined by the Range parameter on the worksheet) from a specified location (determined by the selection filter UTM coordinates specified on the worksheet). You can use the ***Census Blocks/Selection Filter/Set Selection Filter Origin to Facility Location*** option to insert the coordinates of a facility into the Selection Filter box. This makes is easy to include all census receptors within a specified distance of a particular facility. The second criterion is that each selected receptor must lie within the county specified in the selection filter box. If either of these criteria is left blank, then it is ignored when conducting the search. The search is actually started when you select ***Census Blocks/Insert Receptors Using Selection Filter*** (refer to section 9.12.7.3.2).

To make it easier to setup the Selection Filter, you may specify the county by selecting ***Census Blocks/Selection Filter/ Select County*** from the menu. This allows you to specify the county by selecting from a list.

9.12.7.3.2 Insert Receptors Using Selection Filter (Census Blocks Worksheet)

This menu option appears under the ***Census Receptors*** menu when the sensitive receptors worksheet is displayed. This causes the program to search the database for census blocks which meet the criteria specified in the box labeled Selection Filter, and insert receptors corresponding to those census blocks into the table.

9.12.7.3.3 Delete Rows (Census Blocks Worksheet)

This menu option is used to delete entire rows from the census block receptors table on the Census Blocks worksheet. First place the cursor on the row that you want to delete. If you want to delete multiple rows, place the cursor on the first row that you want to delete and drag the mouse downward to select how many rows you want to delete. Then select ***Census Blocks/Delete Rows*** from the menu.

9.12.7.3.4 Auto-generate Receptor IDs (Census Blocks Worksheet)

When you create a new row in the Census Blocks worksheet by selecting ***Insert Receptors Using Selection Filter*** (refer to section 9.12.7.3.2) the Receptor IDs are not automatically created. Each receptor must have a corresponding ID on the census blocks worksheet. If you wish, you may provide these IDs by simply entering any string of up to 8 characters under the Receptor ID column for each sensitive receptor. This may be desirable if you want the IDs to be some meaningful descriptors that you invent. Another way to create Receptor IDs is to use the auto-generate function.

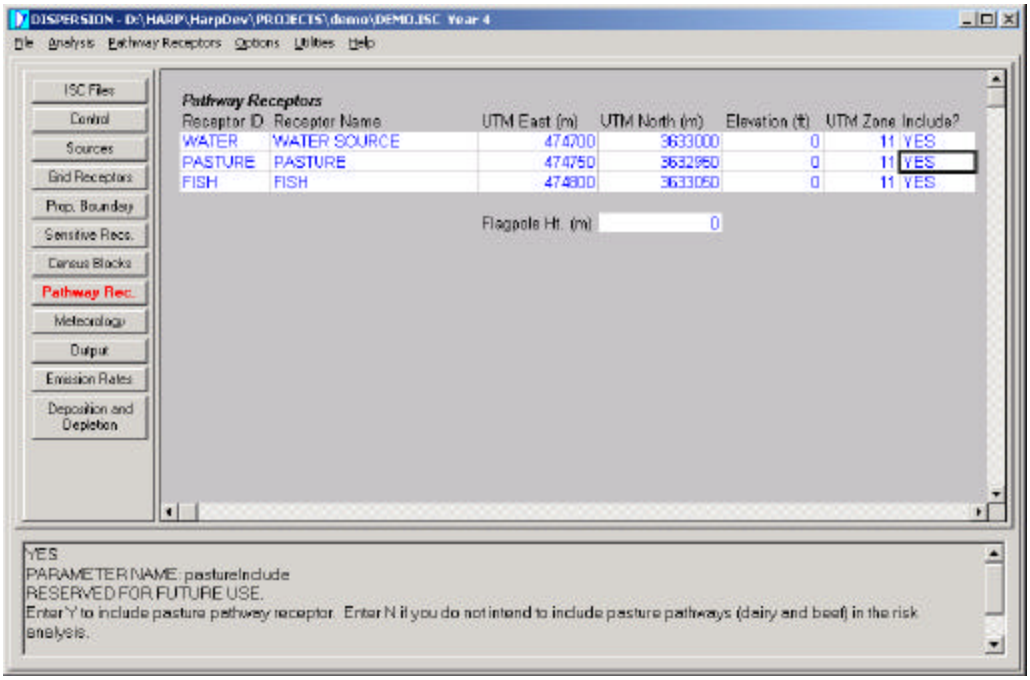
First highlight the rows for which you want to create new IDs automatically. To do this, place the cursor on any row of your choosing and drag the mouse downward to select the rows for which you want to generate IDs. Then select ***Auto-generate Receptor IDs*** from the menu. The program will create Receptor IDs based on the row numbers and place the IDs in the correct cells on the worksheet.

9.12.7.3.5 Fill in Elevations (Census Blocks Worksheet)

If you have loaded DEM data, then this function will fill in the elevations for each of the receptors on this worksheet. Refer to section 9.13.

9.12.8 Pathway Receptors Worksheet

This worksheet is used to describe the locations of pathway receptors that may be required for risk assessment. These three receptors define the locations of the drinking water, the pasture and the locally caught fish. **The cells in the column "Include" must say yes if you intend to run a multipathway analysis in the risk analysis.** Section 9.12.8.1 describes each of the parameters on this worksheet.



9.12.8.1 Pathway Receptors Parameters (Pathway Receptors Worksheet)

The pathway receptor parameters are always filled in manually.

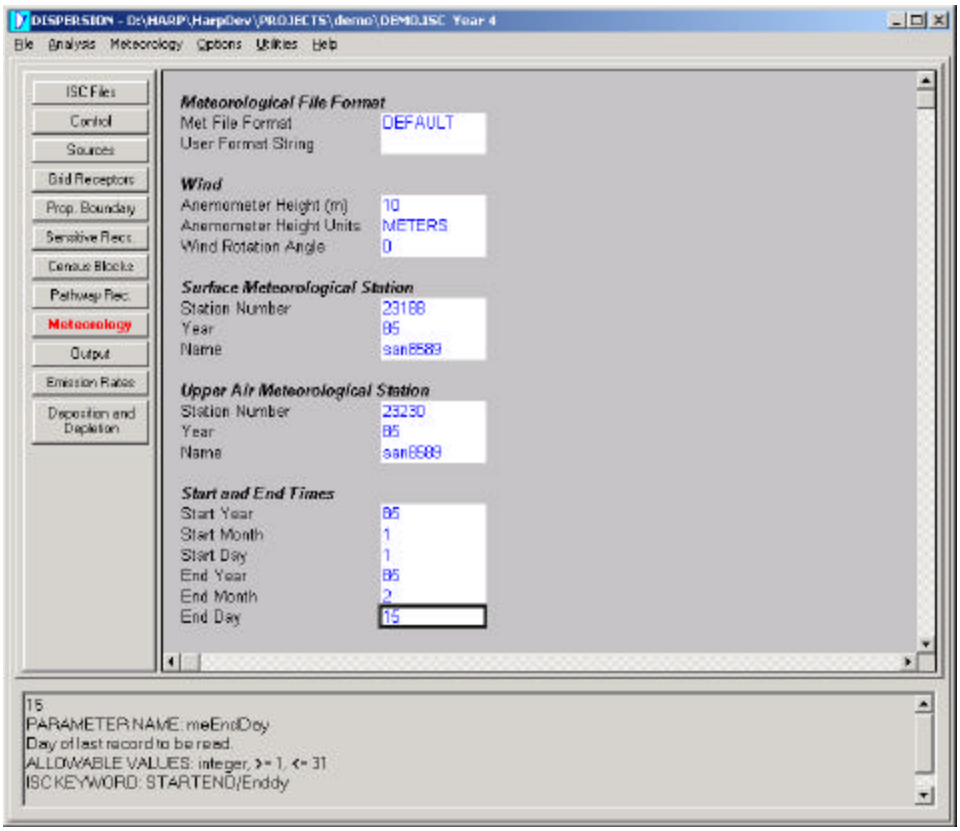
Receptor ID	This is fixed by the program
Receptor Name	A descriptor of this receptor that you provide.
UTM East	UTM east coordinates of this receptor.
UTM North	UTM north coordinates of this receptor.
Elevation	Elevation of this receptor.
UTM Zone	UTM zone in which this receptor is located.
Include?	Enter either Yes or No. If yes, then this receptor is included in the ISC run. If no, this receptor is not included. You can choose to not include a pathway receptor if you do not intend to do risk analysis, or if you know that this particular pathway is not relevant to your location.
Flagpole Height	The flagpole height (meters) for all pathway receptors. See section 9.12.4.5 for more information.

9.12.8.2 Fill in Elevations (Pathway Receptors Worksheet)

If you have loaded DEM data, then this function will fill in the elevations for each of the receptors on this worksheet. Refer to section 9.13.

9.12.9 Meteorology Worksheet

The Meteorology worksheet is used to specify meteorology input for ISC. Section 9.12.9.1 describes each of the parameters on this worksheet. Meteorology parameters are also described in section 3.5 of the *User's Guide for the Industrial Source Complex (ISC) Dispersion Models*.



9.12.9.1 Meteorology Parameters (Meteorology Worksheet)

Met File Format	Format of meteorological data file. Enter DEFAULT to specify that the default ASCII file format is used. Enter FREE for free format. Enter CARD for default ASCII file format with wind speed profile and temperature gradient data entered below (not implemented in this version). Enter UNFORM for unformatted RAMMET file input. Enter USER to specify a FORTRAN format statment in the cell below. The meteorology file name is specified by selecting Display/Files from the menu.
User Format String	Format string used to read meteorological data file. This parameter is only used if the file format specified above is USER.
Anemometer Height	Anemometer height.
Anemometer Height Units	Anemometer height units.

Wind Rotation Angle	Wind rotation angle.
Station Number	Station number, e.g. 5-digit WBAN number
Year	Year of data being processed.
Name	Station name
Start Year	Year of first record to be read.
Start Month	Month of first record to be read.
Start Day	Day of first record to be read.
End Year	Year of last record to be read.
End Month	Month of last record to be read.
End Day	Day of last record to be read.

When you open a met file, the station numbers and start and end times are filled in automatically. You can then edit the start and end times manually.

9.12.9.1.1 Open Meteorology File

When you select this menu item, you will be prompted for the name of a meteorology file. HARP will then open the file and fill in the start and end time on the meteorology worksheet. The name of the meteorology file will appear on the ***ISC Files*** worksheet. HARP will read meteorology files with the extensions *.met, *.txt, *.dat, *.sam, and *.asc.

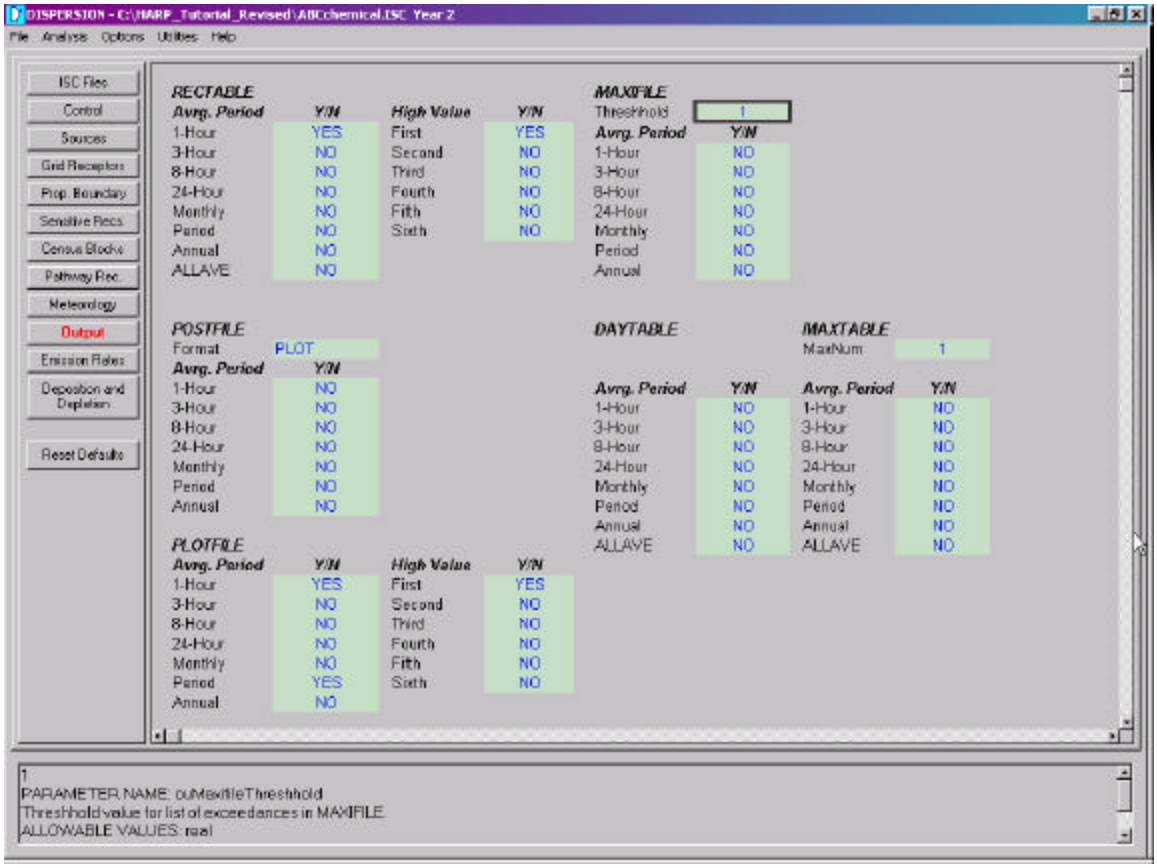
9.12.9.2 Open Pit Volume Source Meteorology Requirements

An open pit source (PITVOL) requires the use of deposition (see section 9.12.12). This in turn requires the use of a meteorology file that includes surface roughness. An example of such a met file is the file DEPTEST.MET that is included with ISC (a copy is installed with HARP).

9.12.10 Output Parameters Worksheet

The Output Parameters worksheet is used to control the numerous ISC output options. Section 9.12.10.1 describes each of the parameters on this worksheet. Output parameters are also described in section 3.8 of the *User's Guide for the Industrial Source Complex (ISC) Dispersion Models*.

The output parameters that you choose do not affect the risk analysis. They are only used to control the ISC reports that appear in the standard output file, the plot file and the post file.



9.12.10.1 Output Parameters (Output Parameters Worksheet)

Rectable Avrg Period	Enter Y or N in each of the cells in this column to indicate which averaging period you want summarized with high values in the ISC output. The number of high values is indicated by the responses in the column to the right..
Rectable High Value	Enter Y or N in each of the cells in this column to indicate which high value summaries you want output to the ISC output file.
Postfile Format	Format of the postfile output. Enter UNFORM to indicate unformatted (binary) output. Enter PLOT to indicate formatted (ASCII) file format.
Postfile Avrg. Period	Enter Y or N in each of the cells in this column to indicate which averaging period you want output to the postfile.
Plotfile Avrg Period	Enter Y or N in each of the cells in this column to indicate which averaging period you want output to the plotfile.
Plotfile High Value	Enter Y or N in each of the cells in this column to indicate which high value summaries you want output to the plotfile.
Maxifile Threshhold	Threshhold value for list of exceedances in MAXIFILE.

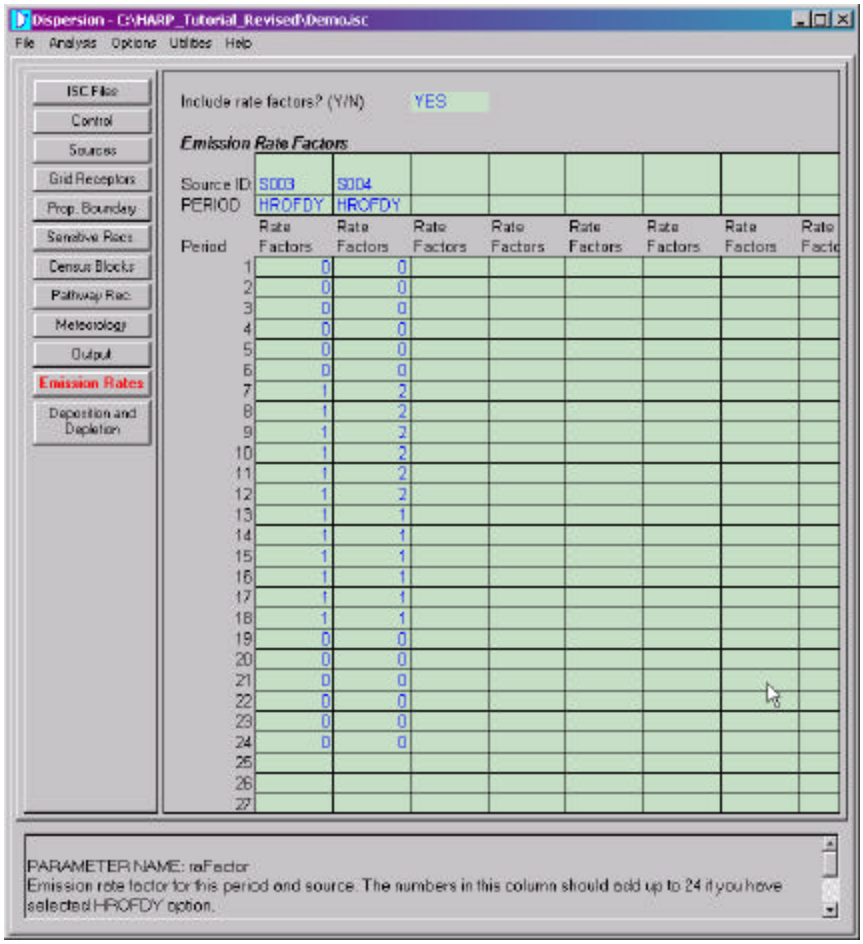
Maxifile Avrg. Period	Enter Y or N in each of the cells in this column to indicate which averaging period you want output to the MAXIFILE.
Daytable Avrg. Period	Enter Y or N in each of the cells in this column to indicate which averaging period you want output to the DAYTABLE.
Maxtable Maxnum	Specifies number of overall maximum values to be sumarized in the MAXTABLE.
Maxtable Avrg. Period	Enter Y or N in each of the cells in this column to indicate which averaging period you want output to the MAXTABLE.

9.12.11 Emission Rate Worksheet

This worksheet page is only valid when conducting model simulations with representative meteorological data. It is incorrect to use this worksheet page for model simulations requiring SCREENING meteorological data.

It is important to synchronize diurnal emissions with hourly meteorological conditions. For example, a facility that only operates in the afternoon, from noon to 5pm, should create an emission rate profile so that emissions are simulated in the model only during that period of noon to 5pm. Meteorological conditions vary during the course of a 24-hour period and throughout the year. Incorrectly assigning emissions to the wrong part of a day will result in inappropriate assessments of downwind dispersion, impacts, and ?/Q.

The Emission Rate Factors worksheet, shown below, is used to specify the emission profile for the temporal variation over the period. A typical profile may specify 24 values (one for each hour of the day) to indicate the temporal variation over the 24-hour period that represents the facility's normal operating conditions. Other profiles can be specified such as by month or season. See below for a further description of the various temporal profiles available. Section 9.12.11.1 describes each of the parameters on this worksheet.



9.12.11.1 Emission Rate Parameters (Emission Rate Worksheet)

Include Rate Factors	Enter Y if you want to include variable emission rate factors shown on this worksheet in the ISC input file. Enter N if you do not want to include variable emission rate factors (i.e., ignore all data on this worksheet and use a constant emission rate for all hours of simulation).
Source ID	Source ID for the emission rate factors are listed in this column. The Source IDs must be entered manually.
Period	Flag to specify the period over which the emission rate factors will vary. Allowable inputs are: SEASON (seasonal, 4 values), MONTH (monthly, 12 values), HROFDY (hour of day, 24 values), STAR (speed-by-stability, 36 values), SEASHR (season-by-hour, 96 values). Consult the ISC3 User's Guide for more details on the emission rate flags.
Rate Factors	Emission rate factor for this period and source.

9.12.11.2 Period Rate Factors (Emission Rate Worksheet)

The emission rate factors are directly multiplied by the emission rate to obtain a hour-by-hour emission rate for each source. (In this case for HARP, the emission rate is 1 gram per second (1 g/s) to determine ?/Q and the hour-by-hour emission rate is the relative emission rate.)

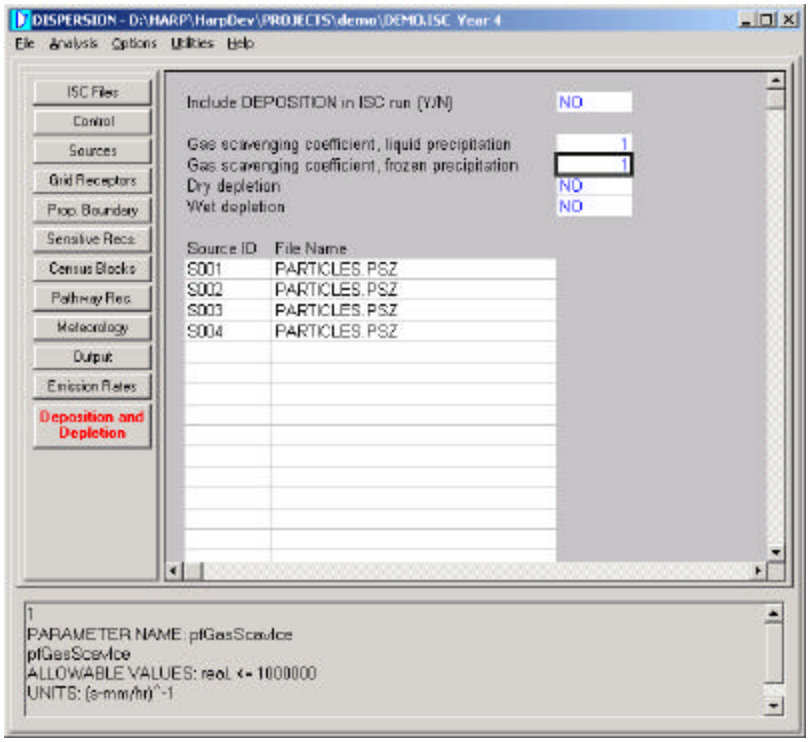
For example, a widget shop may have two emission sources. Source A is fugitive and emits 12 hours a day at a constant rate when the workers are at the shop. Source B is a function of operating hours but is twice as high in the morning because the machinery operates better in the morning. Therefore in the emission factor worksheet, Source A will have a period of HROFDY. 24 factors are required for HROFDY and the user will enter 0,0,0,0,0,0,1,1,1,1,1,1,1,1,1,1,1,1,0,0,0,0,0,0 to represent the fugitive emission rate profile. Source B will have a period of HROFDY. The user will enter 24 values for Source B as follows: 0,0,0,0,0,0,2,2,2,2,2,2,1,1,1,1,1,1,0,0,0,0,0,0. The emission factor of 2 represents twice the emissions in the morning as compared to the afternoon emission factor of 1.

HARP expects the correct number of factors for the appropriate adjustment period. In order for HARP to coordinate the annual emission rate in tons/year with the emission factors, HARP will normalize the factors. In the case above for Source B, the 0's will remain 0's, the 2's will become 2.67, and the 1's will become 1.33. In this manner, the sum of the emission factors equals the number of values required (e.g., 24 in this case).

9.12.12 Deposition and Depletion Worksheet

The Deposition and Depletion worksheet is used to specify deposition and depletion parameters for ISC. Deposition and plume depletion are normally turned off, so the first parameter ("Include DEPOSITION in ISC run (Y/N))" is set to NO. In the OEHHA Guidelines, deposition is treated separately with the constant deposition parameters, and depletion is not considered. The OEHHA Guidelines recognize double counting of emissions occur when plume depletion is not included.

Plume deposition and depletion require detailed information on the particle size, density, and distribution. These data are not always available. For the purposes of research, the DEPOSITION option is available to advanced users of HARP. Consult the ISCST3 User's Guide for further information.



9.12.12.1 Deposition and Depletion Parameters (Deposition and Depletion Worksheet)

Include DEPOSITION in ISC	Enter Y if you want to include deposition in the ISC model. Enter N otherwise
Gas scavenging coefficient liquid	Refer to ISC manual.
Gas scavenging coefficient frozen	Refer to ISC manual.
Dry depletion	Refer to ISC manual, parameter DRYDPLT
Wet depletion	Refer to ISC manual, parameter WETDPLT

9.12.12.2 Particle Size Distribution File (Deposition and Depletion Worksheet)

The deposition model requires that a particle size distribution be provided for each of the sources. HARP requires that these distributions be stored in external files. In the table shown above, you must specify the source IDs in the first column and the name of the particle distribution file in the second column. The source IDs correspond to the IDs that you specified on the Sources worksheet.

The format of the file is shown below. The first two lines are for comments, and are skipped by the program when the file is read. These are followed by up to 20 lines of data describing the distribution. Each line has four numbers, which are the values of particle diameter, mass fraction, density, liquid scavenging coefficient and frozen scavenging coefficient.

Particle size distribution file; first two lines are skipped; up to 20 data lines			
diam(microns), mass fraction, density(g/cm^3), liq scvnging coef, frozen scvnging coef			
2.97	0.0426 1	2.10E-04	7.00E-05
1.89	0.0851 1	1.40E-04	5.00E-05
0.93	0.1702 1	5.00E-05	2.00E-05
0.55	0.1915 1	5.00E-05	2.00E-05
0.40	0.1915 1	6.00E-05	2.00E-05
0.27	0.1191 1	9.00E-05	3.00E-05
0.18	0.1000 1	1.30E-04	4.00E-05
0.12	0.0500 1	1.50E-04	5.00E-05
0.062	0.0400 1	2.00E-04	7.00E-05
0.03	0.0100 1	2.20E-04	7.00E-05

9.13 Using DEM Data for Elevations (File extension *.dem)

Elevation data can be obtained in the format of DEM (Digital Elevation Model) files from the United States Geological Survey (USGS). This data can be utilized by HARP to simplify the determination of elevations of sources and receptors so that you do not have to enter elevations manually.

To utilize DEM data for elevations when setting up the dispersion run, you must first open one or more DEM files. To open a DEM file, select ***Files/DEM/Open DEM file*** from the menu of the dispersion window. You will be prompted for the name of the file, which should have a .DEM extension. HARP will then read the file and load the DEM data into memory, where it is available to be used for looking up source and receptor elevations.

To fill in all source and receptor elevations on the workbook select ***Utilities/Look Up All Elevations*** from the menu. The elevations will be filled in to the appropriate locations on all worksheets. Any values that you had entered into those cells will be overwritten.

Each of the sheet-specific menus (for example the ***Sources*** menu and the ***Grid Receptors*** menu) has a selection labeled ***Fill in Elevations***. This serves the same function as described above, but operates only on one of the worksheets.

You should be sure that the DEM data that you acquire covers the area of interest. If HARP attempts to look up the elevation for a source or receptor that is outside of the range of the DEM data, HARP will fill in a value of zero.

It is quite possible that the area that you are analyzing is not covered by a single DEM file. You can open more than one DEM file concurrently by repeatedly selecting ***Files/DEM/Open DEM file*** from the menu. This allows you to cover a wider geographic area than would be provided by only a single DEM file. To see what files are currently open, select ***Files/DEM/List Open DEM Files*** from the menu.

If you have loaded multiple DEM files into memory concurrently, HARP will remember the names of all of the files the next time you run HARP. Instead of loading each file

individually, you can select ***Files/DEM/Load Most Recent DEM Files*** from the menu. HARP will then load all of the files in sequence.

You can also open the DEM files from the File menu of the Risk window. Open the DEM files from either place has the same effect. Once the DEM file(s) are open, you may interactively look up the elevation for any location on a map shown on the risk window. To do this, set the "mouse action" (lower right corner of Risk window) to "look up elevation", then click anywhere on the map and read the elevation on the bottom of the window.

Chapter 10 Table of Contents

10. Risk Analysis

The purpose of the Risk Analysis module in HARP is to provide the tool for preparing Health Risk Assessments as specified in the Office of Environmental Health Hazard Assessment's document *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* (OEHHA, 2003). This document is referred to throughout this manual as the "OEHHA Guidance Manual". Users of the HARP software are assumed to have a working understanding of the risk assessment methods and procedures outlined in the OEHHA Guidance Manual.

HARP can be used by Air Pollution Control and Air Quality Management Districts (Districts), facility operators, and other parties to manage and evaluate emissions inventory data and the potential health impacts associated these emissions. The use of HARP promotes statewide consistency, increases the efficiency of evaluating potential health impacts, and provides a cost-effective tool for developing facility health risk assessments.

Although designed to meet the programmatic requirements of the Hot Spots Program, the HARP software may be used for preparing risk assessments for other air related programs (e.g., air toxic control measure development, facility permitting applications). Therefore, each user of the HARP software should know the requirements of the regulation or program they are addressing before using the HARP software.

The HARP software may be used to assess the potential multipathway health impacts from a single facility or multiple facilities in (close) proximity to each other, where a single meteorological data set is appropriate for all the included facilities. However, other applications may be appropriate depending on the presence of adequate data and the user's expertise.

The Risk Analysis module allows the user to estimate the multipathway health impacts at multiple receptor locations from one or more pollutants released from one or more emission points. Carcinogenic and non-carcinogenic impacts may be evaluated. The user may conduct a point-estimate analysis or utilize the data distributions available to conduct a stochastic analysis. Users may also supply their own adequately supported point-estimates or data distributions by editing the network.

This chapter provides a description of the functions available in the risk assessment module of the HARP software. See Chapter 4 for a tutorial on HARP or Appendix A for a set of simple "how to" guides that are intended to assist users with some basic HARP applications.

The following topics are covered in the list of "how to" guides that are found in Appendix A.

- Emission inventory setup.
- Facility prioritization.
- Setting up an air dispersion run.
- Performing a risk assessment for one or more facilities with one or more release points.
- Performing a risk assessment by entering a ground level concentration (GLC).
- Mapping a facility.

10.1 HARP Risk Analysis Algorithms and Default Values

The risk analysis algorithms and default values used in HARP are based on the Office of Environmental Health Hazard Assessment's (OEHHA) Guidelines set forth in the *Technical Support Document for Exposure Assessment and Stochastic Analysis* (OEHHA, 2000). All equations, default parameter values, and variable distributions encoded into HARP are from the OEHHA Guidance Manual.

In addition to using the point-estimates of exposure and data distributions supplied in the OEHHA Guidance Manual, HARP users may input there own appropriately supported point-estimates or data distributions by editing the network. For more information on adding user-supplied data into the network to perform a Tier-2 or Tier-4 risk assessment, see Sections 10.7.6.2, 10.7.6.4, and 10.7.6.5.

10.1.1. Inhalation-Only or Multipathway Analysis

The OEHHA Guidance Manual provides guidance on when it is appropriate to conduct an inhalation-only or a multipathway analysis. A multipathway risk analysis includes the potential health impacts from other exposure pathways (e.g., soil or fish ingestion) in addition to the inhalation route. The multipathway analysis utilizes the algorithms in the OEHHA Guidance Manual to estimate how the chemicals are transported through the various physical pathways (for example food, drinking water, inhalation) to reach the human body. Within the human body, each chemical may have various adverse effects (e.g., cancer or non-cancer impacts) and they may impact various biological systems (for example lungs, cardiovascular, reproductive). These biological systems are referred to as toxicological endpoints. HARP combines both the Multipathway model and the toxicological endpoints into a single complex network. This Multipathway network takes into account the substances, exposure scenario, chemical concentrations, and run-control parameters each time the HARP program executes an analysis.

10.1.2 Point-Estimate vs. Stochastic Analysis

The stochastic analysis takes into account the variability of certain input parameters (for example breathing rate and food ingestion rates) among the human population. Stochastic analysis is accomplished by Monte Carlo simulation. HARP does this by randomly sampling the data distributions to obtain input parameters that are used in each trial or analysis. The program executes multiple trials, and the results of all of the trials are accumulated for post-processing. In the post-processing phase, the trial values are sorted and analyzed to create plots of the statistical distribution of the calculated potential cancer risk. These distributions can then be used to estimate the expected risk at a specific confidence level.

The point-estimate analysis uses a single value rather than a distribution of values in the dose equation for each exposure pathway. Both the point-estimate and stochastic analysis are performed by HARP. The choice of which type of analysis should be used for the HRA (point-estimate versus stochastic) will depend on the assessor's or programmatic needs for the risk assessment. For more guidance on which assessment is appropriate for you, see the

description for the tiered-approach to risk assessment in Section 8.2.5 of the OEHHA Guidance Manual.

10.1.3 Keeping a Record of Risk Assessment Results

The files listed below are the records that should be kept electronically for any HARP analysis. These files are needed to expedite re-creation of reported results. If additional information is needed to support inputs included in HARP, then they too should be kept as a record of support. Detailed information on reporting results for Hot Spot analyses can be found in the OEHHA Guidance Manual (Chapter 9) or you should contact your local District for information on presenting the results of a risk assessment. Critical files are marked with an asterisk.

- HARP Facility Database for included facilities (*filename.*MDB)*
- ISC workbook file with all ISC parameters (*filename.*ISC)*
- ISC input file generated by HARP when ISC is run (*filename.*INP)
- ISC output file generated by HARP when ISC in run (*finename.*OUT)
- List of error messages generated by ISC (*filename.*ERR)
- Plot file generated by ISC (*filename.*PLT)
- Representative meteorological data used for the facility air dispersion modeling (*filename.*MET)*
- Any digital elevation model files (if applicable) (*filename.*DEM)*
- Average and maximum χ/Q values for each source-receptor combination; generated by ISC (*filename.*XOQ)
- ISC binary output file; holds χ/Q for data for each hour (*filename.*BIN)
- Sources receptor file; contains list of sources and receptors for the ISC run; generated by HARP when you set up ISC (*filename.*SRC)
- Emission Rate files (if applicable) (*filename.*EMS)*
- Site-specific parameters used for all receptor risk modeling (*filename.*SIT)*
- (Screening) Adjustment Factor Files (if applicable) (*filename.*ADJ)*
- Point estimate risk values generated by HARP; this file is updated automatically each time you perform one of the point estimate risk analysis functions (*filename.*RSK)
- HARP Exception Report (*ExceptionReport*.TXT)*
- Risk Result Text files for Key Receptors (*filename.*TXT)
- Raw sample data (stochastic) *(filename.*CSV)*
- Stochastic Summary Report *(filename.*TXT)*

10.2 Organization of Risk Analysis Module

10.2.1 Window and Program Organization

There are two primary windows from which you perform risk analysis functions, the point-estimate risk window and the stochastic window. The point-estimate risk window is used for performing multipathway point-estimate risk analyses on one or more receptors. The Stochastic and Multipathway window is used to perform a stochastic analysis using one or more

data distributions of exposure and to view intermediate details of the multipathway analysis for a single receptor.

10.2.1.1 Main Risk Analysis Window

The main risk window is opened by selecting ***Analysis/Risk Analysis*** from the main HARP window. There are two choices in the menu depending on whether you used screening meteorology data or representative meteorology data in your dispersion analysis. The structure of the risk windows is discussed below. Data will only appear in the following windows once you have completed a dispersion analysis.

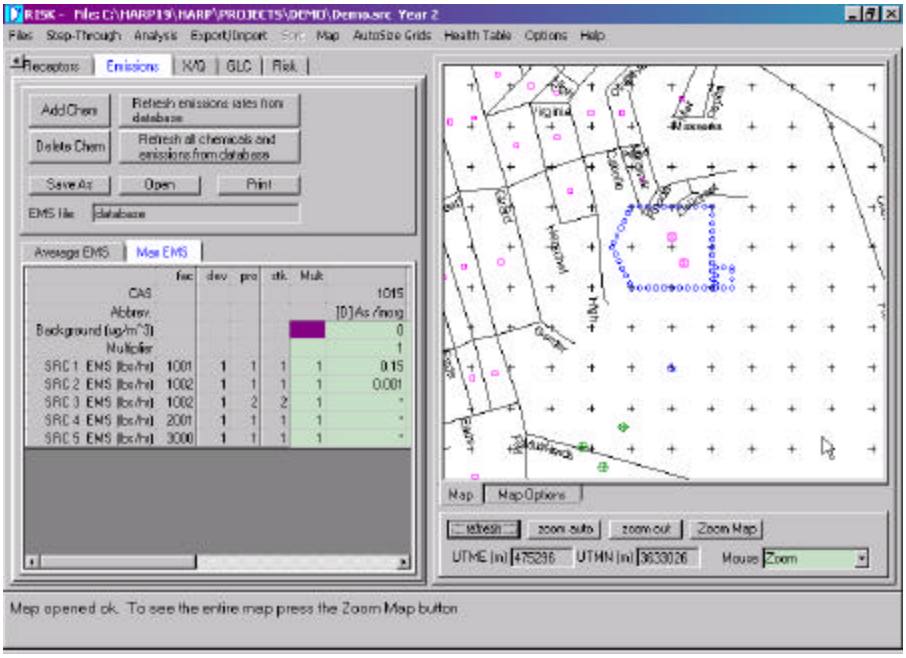
The input and output data that are used in the analysis are displayed in tabular form in the left-hand pane of the window. The right-hand pane of the window displays a map that allows you to visualize the results.

The data pane on the left of the window has several tabs that allow you to select which table you want to view. The tables contain details of sources and receptors used in the analysis, the emission rates, X/Q values (concentration estimated from the air dispersion model), ground level concentrations (GLCs), and risk estimates for each receptor.

The map pane shows a map with options to display streets, buildings, property boundaries, stacks (sources), receptors, elevations, and risk isopleths.

The map pane and the data pane will be synchronized via the mouse actions when the mouse action is set to *Pick Source* or *Pick Receptor* (bottom right of map pane). When you click on a cell on one of the tables in the data pane, the corresponding source or receptor is highlighted on the map pane. Conversely, when you click on a source or receptor on the map pane, the corresponding cell is highlighted on the data pane, provided you have.

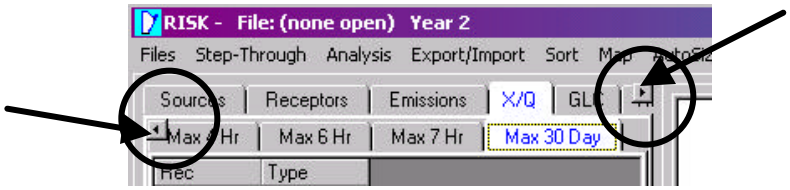
If your computer has difficulty displaying map results for an entire receptor grid, you may have too many receptor points on your grid for your computer to display efficiently. If this situation exists, you may wish to go back to the air dispersion modeling setup and decrease the number of receptor points (Section 9.12.4) in your domain or change to a computer with more memory. If you would like to maintain a receptor grid that is closely spaced to obtain better resolution of the potential risk results, you may need to reduce the size of the entire grid to offset the increase in grid points and run additional analyses to cover the preferred domain.



MAIN RISK WINDOW

10.3 Data View Tabs: Viewing Input Data

When you open a source-receptor file (SRC file), HARP displays all of the source and receptor details under the various tabs on the left side of the risk window. There is not enough room on the risk window to display all of the tabs. Additional tabs can be viewed by pressing the small arrow at the left and right of each row of tabs.

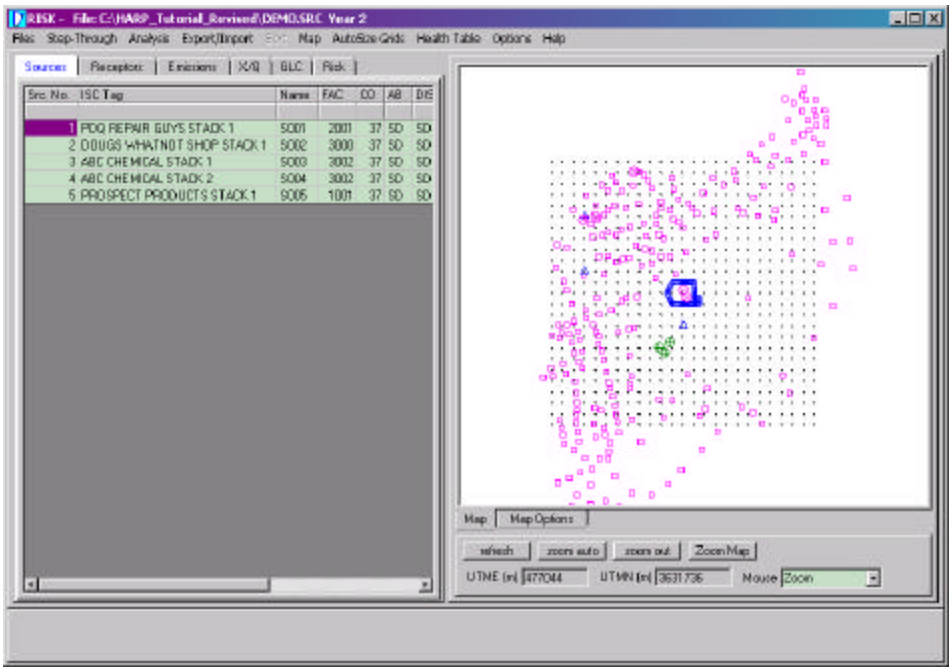


10.3.1 Source Details

The Sources tab on the risk window displays a list of all the sources that will be included in the risk analysis. This information is read by HARP from the SRC file. Note: To add or delete sources you must rerun the dispersion analysis.

Each source in the source details list corresponds to a single stack. If a facility has more than one stack then you will see multiple entries in the source details list for that facility. The columns labeled FAC, CO, AB, DIS, STACK are the facility, county, air basin, district and stack number for this stack. These correspond to the same fields in the HARP emissions inventory database and form the primary key in the stack table in that database. They are used by HARP to

look up emission rates for each chemical from each stack. The source details list also shows the UTM coordinates and elevation of each source.



SOURCE DETAILS

10.3.2 Receptor Details

The Receptors tab on the risk window displays a list of all the receptors that will be included in the risk analysis. This information is read by HARP from the SRC file. To add or delete receptors you must rerun the dispersion analysis.

The Receptors tab has several sub-tabs that each display receptor details for one of the receptor subgroups.

10.3.2.1 Grid Receptors

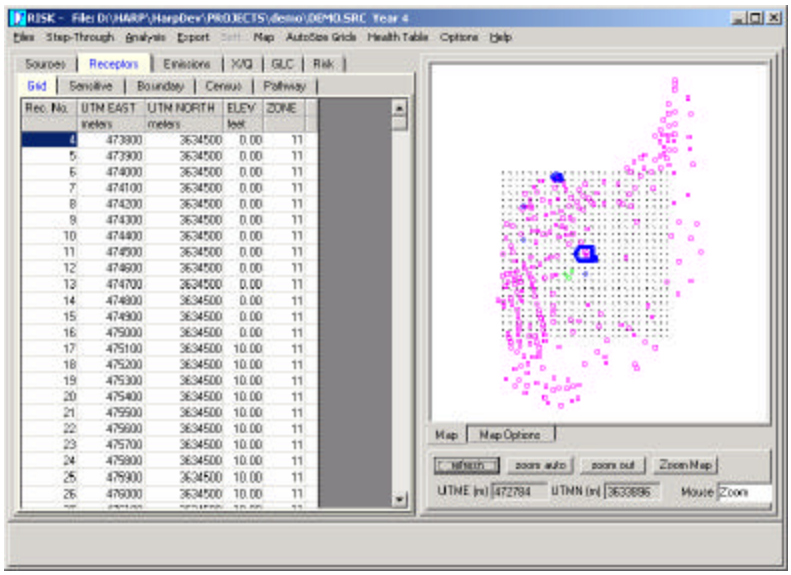
To view the details of the grid receptors, click the Grid tab under the Receptors tab on the risk window. Under the Grid tab you can view details of the grid receptors. The grid receptors are specified when you set up the dispersion analysis.

Grid receptors are a matrix of receptors organized on a rectangular grid over the area that you are analyzing. The grid receptor matrix covers grid points without regard for any identified facility boundaries (i.e., grid points are both inside and outside a facility). Contour lines can be applied to the risk values calculated on grid receptors to produce isopleths that can be viewed on the map (Section 10.6.11).

If your computer has difficulty displaying map results for an entire receptor grid, you may have too many receptor points on your grid for your computer to display efficiently. If this

situation exists, you may wish to go back to the air dispersion modeling setup and decrease the number of receptor points (Section 9.12.4) in your domain or change to a computer with more memory. If you would like to maintain a receptor grid that is closely spaced to obtain better resolution of the potential risk results, you may need to reduce the size of the entire grid to offset the increase in grid points and run additional analyses to cover the preferred domain.

The grid details tab shows the receptor number, the UTM coordinates and the elevations.



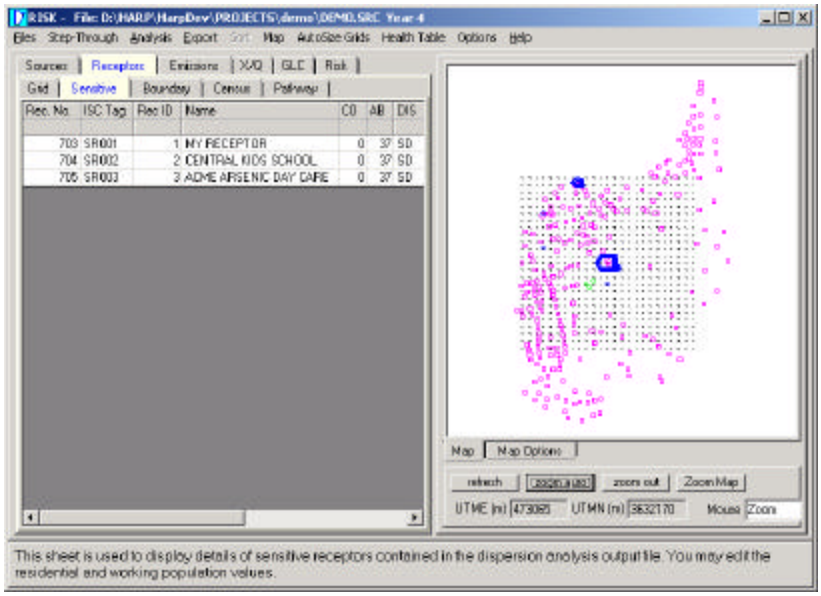
GRID RECEPTOR DETAILS

10.3.2.2 Sensitive Receptors

To view the details of the sensitive receptors, click the Sensitive tab under the Receptors tab on the risk window. The sensitive receptors are specified when you set up the dispersion analysis.

Sensitive receptors are special receptors that are of interest in your analysis. They are generally intended to be located at specific sensitive sites where certain populations may exist, such as a school or nursing home.

The sensitive receptor details show the county, air basin and district under the CO, AB, DIS columns. They correspond to the entries in the HARP emissions inventory database. The columns labeled WRK and RES are the working and residential populations at each receptor. (At present these quantities are not used in the analysis). The last three columns show the UTM coordinates and the elevation of each receptor.



POPULATION RECEPTOR DETAILS

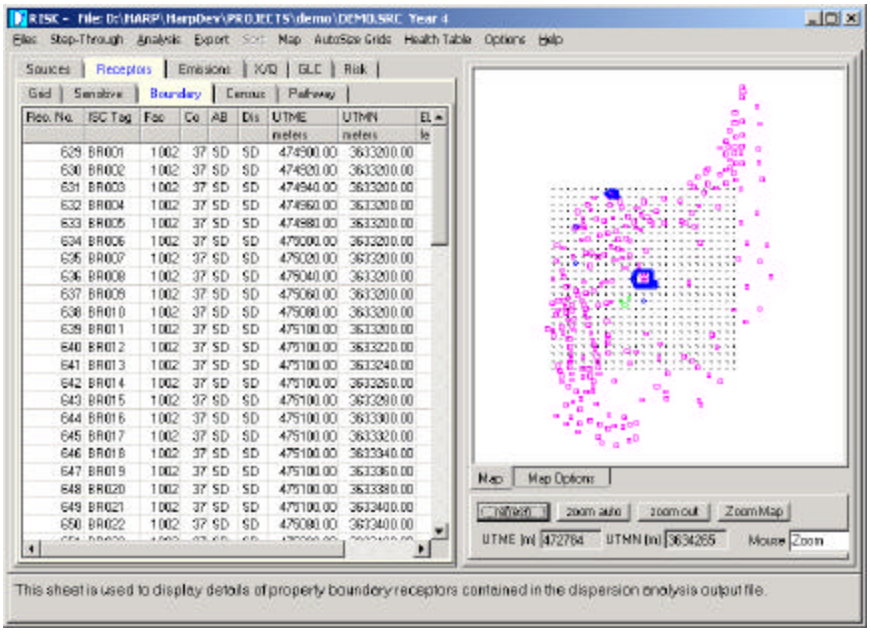
10.3.2.3 Boundary Receptors

To view the details of the boundary receptors, click the Boundary tab under the Receptors tab on the risk window.

The boundary receptors are specified when you set up the dispersion analysis. They are receptors that are placed at intervals along the property boundaries of a facility. They are typically included in the analysis because the Point of Maximum Impact (PMI) location frequently exists at a property boundary close to the stack where the concentration may be highest.

The boundary receptor details show the UTM coordinates and elevation of each receptor. The columns labeled FAC, CO, AB, DIS are the facility, county, air basin and district of the facility on whose property the receptor lies.

Note that the ground level concentration (GLC) at the boundary receptors may be estimated to be zero (0) due to the proximity of a large building. If this situation presents itself and you would like to obtain an estimated concentration or risk, you can turn off Building Downwash under Dispersion/Control (Section 9.12.2).

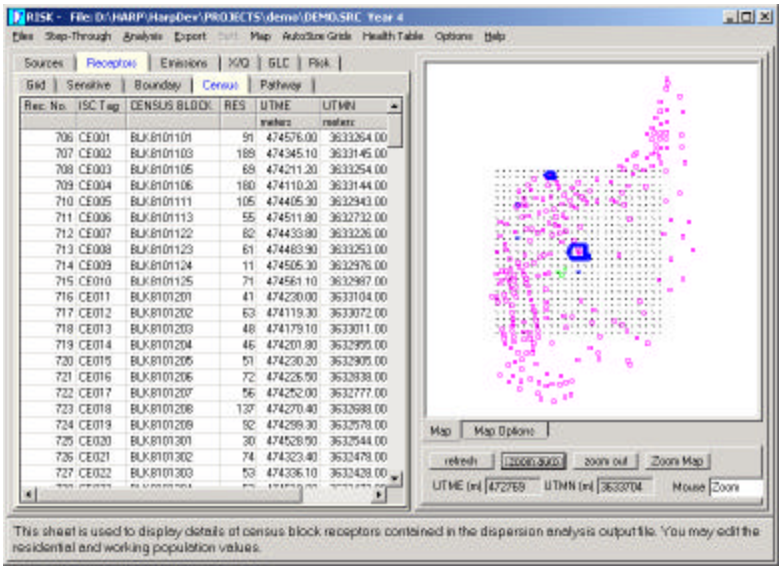


BOUNDARY RECEPTOR DETAILS

10.3.2.4 Census Receptors

To view the details of the census receptors, click the Census tab under the Receptors tab on the risk window.

The census receptors correspond to census blocks that were specified when you set up the dispersion analysis. The census details show the UTM coordinates and elevation of each census block receptor. The RES column shows the residential population of each block. The census receptors are used to calculate cancer burden or to obtain a population-based exposure estimate (see section 9.12.7).

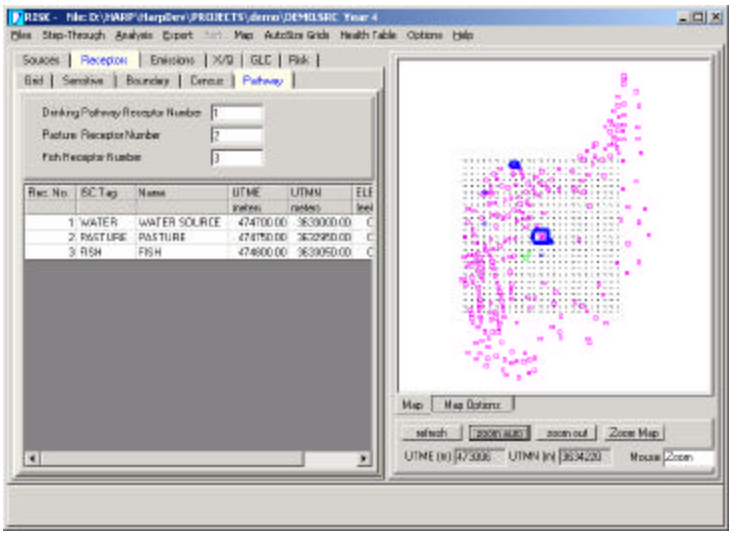


CENSUS RECEPTOR DETAILS

10.3.2.5 Pathway Receptors

To view the details of the pathway receptors, click the Pathway tab under the Receptors tab on the risk window.

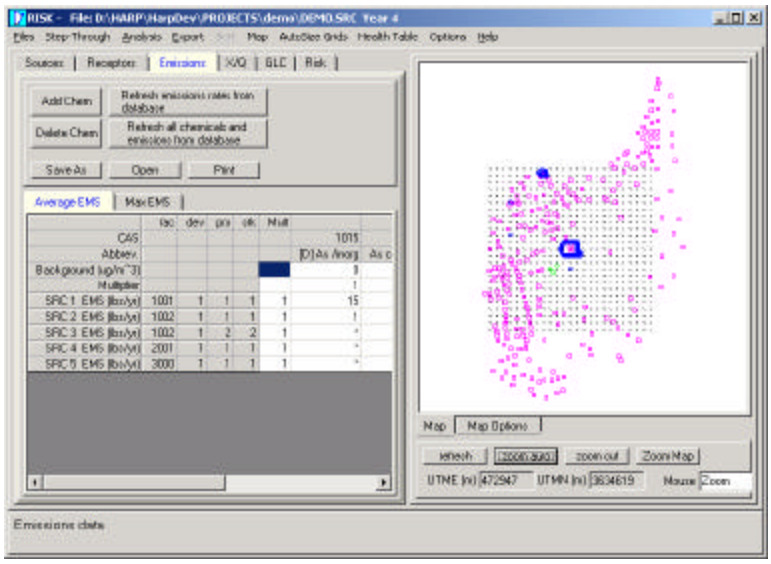
Pathway receptors are the three special receptors that are required for the multipathway risk analysis. They are always placed at the locations of the water, pasture, and fish. The pathway receptor details show the UTM coordinates and the elevation of each of these receptors.



PATHWAY RECEPTOR DETAILS

10.3.3 Emissions

To view the emissions data, click the emissions tab on the risk window. The window will appear similar to the following.



EMISSIONS DETAILS

Each row in the table corresponds to a single process. The columns labeled FAC, DEV, PRO, STK are the facility, device, process and stack. These keys are defined in the HARP emissions inventory database.

The stacks that are included in the analysis are specified when you set up the dispersion analysis. The processes that are connected to those stacks are determined automatically by HARP in order to fill out this table. It is necessary to breakdown the emission rates at the process level because it is the process rates that determine the emissions in the emissions inventory database.

The columns towards the right of the table correspond to different substances. The numbers in the cells under each chemical show the emission rate of that chemical from each of the processes. Cells containing an * (asterisk) indicates that the substance is not produced by that process.

The columns and rows labeled ***Mult*** are user-defined multipliers that you can change if you want to attenuate the emission rate of any chemical or process by some factor to see what the effect on risk would be. The default value for all the multipliers is 1. For example, if we add a 2, the risk would double. For further details refer to section 10.6.7.

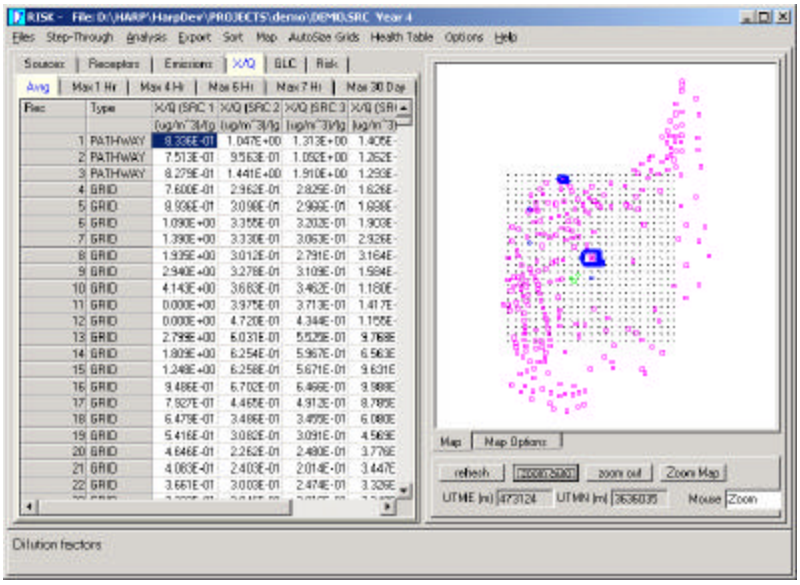
In the left column of this screen, there is a row that is titled "Background". This row can be used to run a risk analysis across all receptors for a user-defined ground level concentration (GLC) in micrograms per cubic meter ($\mu g/m^3$) for one or more substances. For each substance that is included in the background assessment, insert the GLC value, insert a one (1) into the multiplier row, and blank out the source emissions row for each substance, then proceed to the "Risk Reports" window to define your risk analysis (Section 10.6). Additional information can be found in Appendix A.

10.3.3.1 X/Q

To view the X/Q data, click the X/Q tab on the risk window. There are several sub-tabs corresponding to different averaging periods that are required for the analysis.

The receptors are listed vertically along the left column and the sources are listed horizontally along the top row. The source numbers shown in this table correspond to the source numbers listed under the sources tab (see section 10.3.1). The receptor numbers correspond to the receptor numbers listed in each of the receptor detail tabs (see section 10.3.2).

For a modeling run that uses representative meteorological data, the Avrg tab shows the annual average X/Q values for every source-receptor combination. The Max 1-Hr tab shows the maximum value of the 1-hour average X/Q over the duration of the simulation. The remaining tabs show the maximum values of the running average X/Q taken over 4, 6, or 7-hours, and 30-days, respectively. For a modeling run that uses screening meteorological data, only the Max1-Hr tab will show X/Q values.



X/Q DETAILS

10.3.3.2 GLC

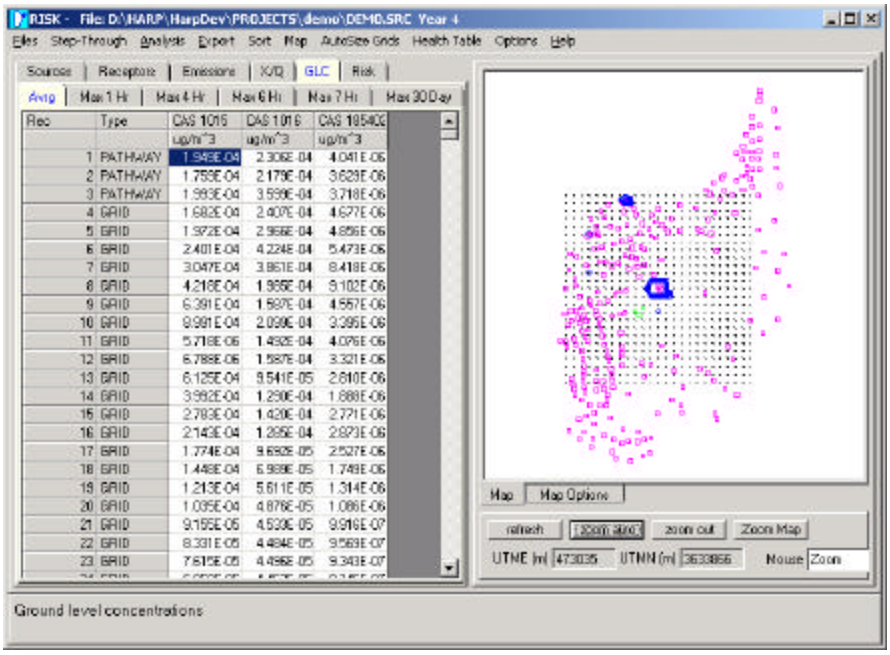
To view the GLC (ground level concentration) data, click the GLC tab on the risk window. There are several sub-tabs corresponding to different averaging periods that are required for the analysis. The receptors are listed vertically along the left column and the chemicals are listed horizontally along the top row.

The Avrg tab shows the average GLC values for every source-receptor combination. The Max 1-Hr tab shows the maximum value of the 1-hour average GLC over the duration of the simulation. The remaining tabs show the maximum values of the running average GLC taken over 4, 6, or 7-hours and 30-days, respectively.

GLC values shown in this table are calculated by HARP when you open the SRC file. They are calculated by multiplying the emission rate for each chemical (as shown in the emission details, see section 10.3.3) by the X/Q values for the corresponding stack and receptor (as shown in the X/Q details, see section 10.3.3.1), and summing over all processes that emit that chemical.

If you change the emission rates by editing the values under the emissions tab, you should update the GLC values by selecting ***Analysis/Recalculate GLC*** from the menu (see section 10.6.7 for details).

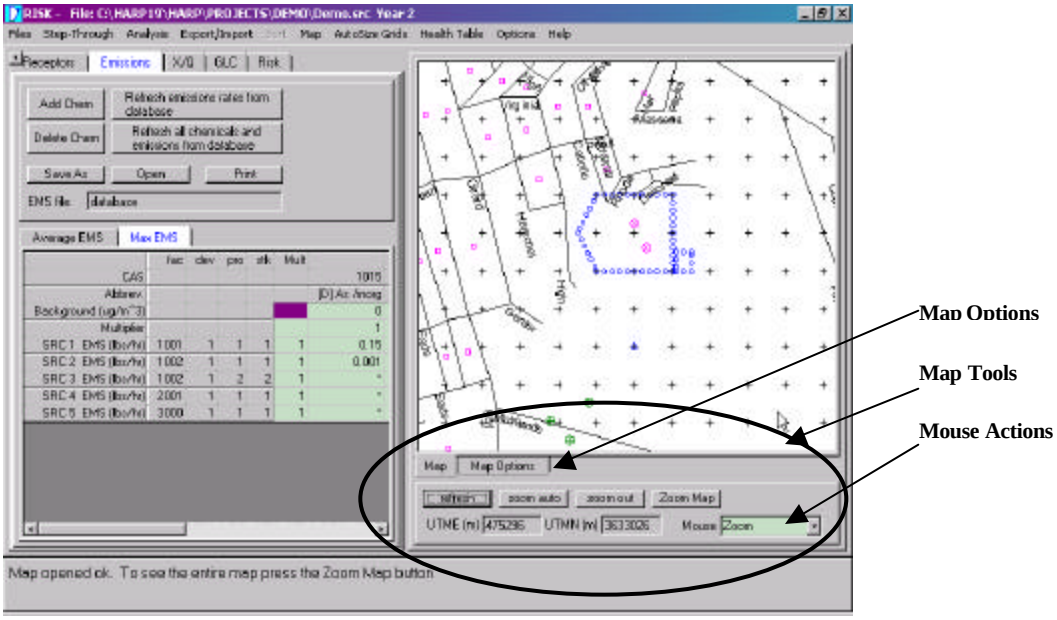
The units of GLC are micrograms per cubic meter.



GLC DETAILS

10.3.4 Navigating the Map on the Risk Window

The right side of the main risk window contains a map of the area included in the risk evaluation. The map pane has options to show maps with streets, buildings, property boundaries, stacks (sources), receptors, elevations, and risk isopleths. Labeling features are also provided. The Map Options button provides the ability to select which features will be displayed in this window or on a printed map.



MAIN RISK WINDOW

The map pane and the data pane are synchronized via the mouse actions (bottom right). When you click on a cell on one of the tables on the data pane, the corresponding source or receptor is highlighted on the map pane. Conversely, when you click on a source or receptor on the map pane, the corresponding cell is highlighted on the data pane, provided you have set the mouse action to Pick Source or Pick Receptor.

If your computer has difficulty displaying map results for an entire receptor grid, you may have too many receptor points on your grid for your computer to display efficiently. If this situation exists, you may wish to go back to the air dispersion modeling setup and decrease the number of receptor points (Section 9.12.4) in your domain or change to a computer with more memory. If you would like to maintain a receptor grid that is closely spaced to obtain better resolution of the potential risk results, you may need to reduce the size of the entire grid to offset the increase in grid points and run additional analyses to cover the preferred domain.

The maps include symbols that identify key features included in the modeling and risk analysis. These symbols are defined here.

+ Black cross hairs mark the location of grid receptors.
□ Magenta squares mark the locations of census receptors.
Å Green circles mark the locations of pathway receptors.
Ä Sources (stacks) are shown on the map as magenta circles with X's in them.
○ Blue circles near the center of the map identify the property boundary receptors. Note: if you select the button ***Map Options*** and check the boxes labeled ***Properties*** **and** ***Bldgs*** and click ***Refresh,*** then property and building boundaries are shown on the map as dotted lines.
△ Blue circles mark the location of sensitive receptors.
— Solid black lines identify street locations with the names written adjacent to them.

10.3.4.1 Locating and Labeling Streets

Use the Map Options Button to show streets with or without their names. Font sizes and labeling frequency can also be tailored. Place a check mark or numeric value in the appropriate box to activate the desired feature. The refresh button should be used to update the map to include the features chosen in map options.

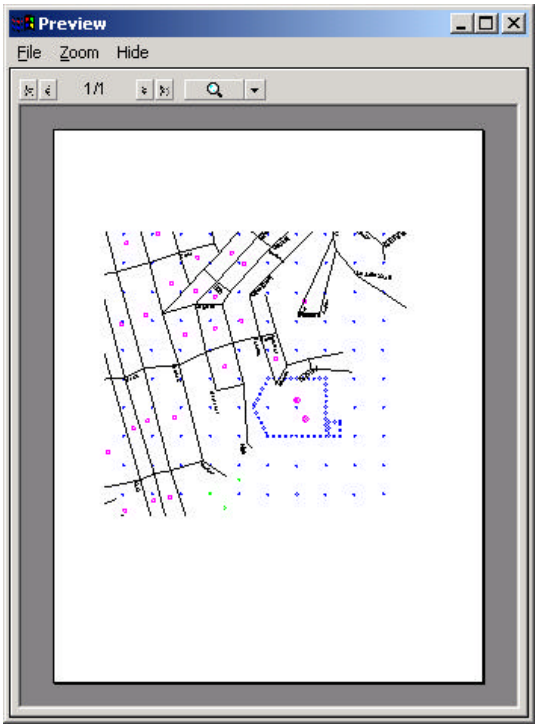
Note: A labeling frequency of one causes every intersection to be labeled with a street name. To reduce the labeling frequency to every other intersection, change the frequency to 2. For every third intersection, change it to 3, and so forth. The larger the number, the less frequent the names will be plotted.

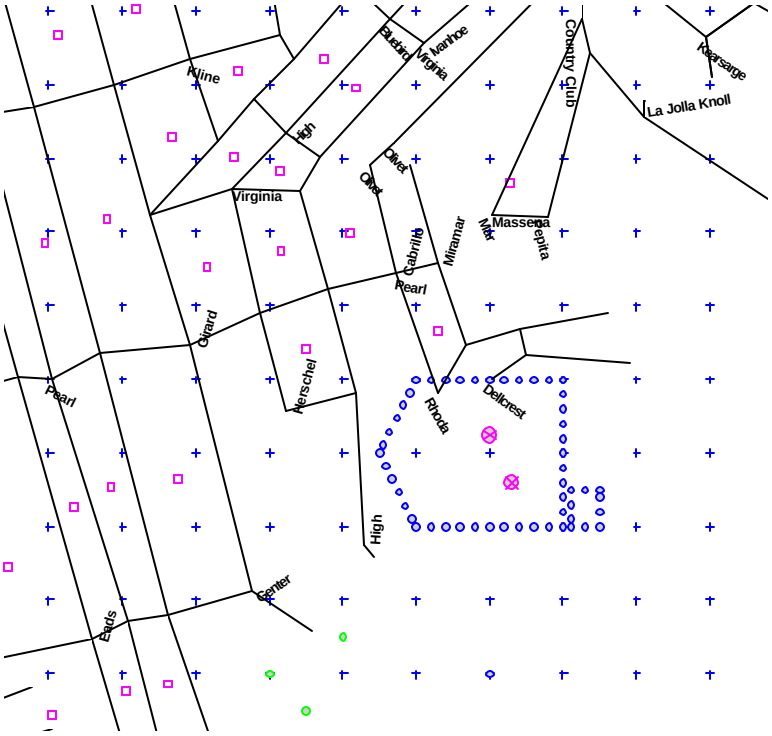
A street search feature is also included. Enter the name of the street that you want to locate in the search field. If you check ***Whole word only***, then only streets that exactly match the word you enter will be highlighted. This is essential, for example, to find a street such as "L" street, where there would otherwise be too many matches for practical purposes.

Note**:** When the map is being redrawn, a ***STOP*** button will appear in the lower right corner. Press this button if you want to stop the drawing. See the tutorial in Chapter 4 for more information on mapping.

10.3.4.2 Printing and Exporting Maps

To print or export a map, adjust the drawing parameters as described in the previous section so that the map looks the way you want it to and select ***Map/Print Preview***. The map will be displayed in a *Preview* window as shown below. From the *Preview* window you can select ***File/Print*** if you have a printer attached. The map will be printed exactly as it is shown. From the *Map Preview* window, select ***File/Copy to Clipboard.*** Open Microsoft Word or any other word processor and transfer the map to the appropriate location in the document. Select ***Edit/Paste Special***, and then select ***Enhanced Metafile*** to paste the map into your document. Use the Word cropping tool to remove the white space from the edges of the map. Then format the picture, choosing a wrapping style that will fit within your text.





Sample Map Inserted into Word Documents

10.4 Files Used by the Risk Module

10.4.1 Project Directory

When running dispersion analysis or risk analysis most of the intermediate input and output files used by the program will reside in a single directory, which is called the project directory. This may be any directory of your choosing.

To specify the project directory, select ***Project*** from the HARP main menu. The following window will appear.

PROJECT WINDOW

Enter the name of the directory that you want to use as the project directory followed by the file name *project.ini* as shown above. You may use the browse button to open the Windows file dialog box and search for the directory.

NOTE: The directory that you specify must exist. If you want to create a new directory as your project directory, then you must use the Windows Explorer or other file manager to first create the directory.

After you have specified the directory, press the *OK* button.

10.4.2 Project File (File extension *.ini)

Project.ini is a file that HARP uses to store information about your project, such as the name of the database file that you want to use when working on this project. *Project.ini* is always located in the project directory.

NOTE: You do not have to create the file *project.ini* in advance. If the file does not exist, HARP will create it when you open a new project directory. The contents of *project.ini* are not important to most users, however it is an ASCII file that can be viewed or edited with any text editor.

10.4.3 Emissions Database File (File extension *.mdb)

The emissions database file (*HARP.mdb*) is a Microsoft Access file that contains primarily the emissions inventory data that you have entered into the system. The procedures for entering data are described in Chapter 5 and in the tutorial in Chapter 4.

When opening a new project, HARP will attempt to open the default database file, *HARP.MDB*, which is assumed to be located in the HARP directory. If it cannot open this file, HARP will warn you that you have not yet specified the name of an emissions database to be used for this project. You should then open a database file.

To open a database file select ***Edit Data/Open Database*** from the HARP main menu and use the browser to locate the database file that you want to use. The HARP installation program always installs a default database file called *HARP.MDB* in the HARP directory.

If you wish to create a different database file, then you should copy *HARP.MDB* to a different file name or different project directory, then open the new file as described in the previous paragraph. If you want to clear a new database file of previously entered data, select *Utilities/Multiyear* from the HARP main menu and use the delete feature.

10.4.4 ISC Input File (File extension *.inp)

The ISC input file is the file read by the ISC program and contains all information required by ISC for the dispersion analysis. The ISC input file is generated automatically by HARP when you run the dispersion analysis (see section 9.12).

The name of the ISC can be any valid file name with any extension. You specify the name when you set up the dispersion problem. NOTE: There can be no spaces in the file name. The format of the ISC input file is described separately in the ISC documentation.

10.4.5 Calculating X/Q

Before you can calculate risk you must know the ground level concentrations (GLCs) of each of the chemicals at the receptors of interest. This requires that you first run the dispersion analysis. The dispersion analysis generates X/Q values for every source-receptor combination that you specify. HARP then uses the X/Q values, combined with the emission inventory data from the database, to calculate GLC at every receptor.

CHI/Q or chi/q or X/Q is the concentration estimated from an air quality model based on an emission rate of one gram per second input to the model. Chi/q can be efficiently used to estimate the concentration of multiple inert pollutants simply by multiplying by the emission rate in grams per second. In this way, one model run may be conducted to evaluate the impact of several different inert pollutants.

The X/Q values are stored in two files: 1) the binary (.BIN) file contains hourly X/Q values that are used to calculate maximum hourly acute risk; 2) the X/Q summary file contains average and maximum X/Qs that are used to calculate cancer and chronic risk. These two files are generated automatically when you run the dispersion analysis, and they are opened when you open a source-receptor file by selecting ***Files/Dispersion Analysis Results/Open Source-Receptor File*** from the menu on the risk window.

10.4.5.1 Binary X/Q File (File extension *.bin)

The binary X/Q file is created each time you run ISC. This file contains the X/Q values for every source-receptor combination for every hour of the simulation. Consequently it can be a very large file. It is written in binary in order to reduce the size somewhat compared to ASCII.

This file always has the same root name as the ISC input file and an extension of .BIN. The binary X/Q file is used to compute maximum hourly acute risk (see section 10.6.10.2).

10.4.5.2 X/Q Summary File (File extension *.xoq)

The X/Q summary file contains average and maximum X/Q values for every source-receptor combination. It is created each time you run ISC. Because it does not contain hourly values it is much smaller than the binary X/Q file.

This file always has the same root name as the ISC input file and an extension of .XOQ.

The X/Q summary file contains annual average values that are used to compute cancer and chronic risk. It also contains maximum hourly values that are used for acute risk (see section 10.6.10). The X/Q summary file also contains maximum values of the short term running average concentrations for durations of 4, 6, 7 hours and 30 days. These intervals are preset because they correspond to the averaging times used to develop the acute health hazard indexes for certain chemicals. The maximum value used to compute acute risk for each chemical depends on the averaging time used to develop the acute Reference Exposure Level (REL) for that chemical.

10.4.6 Source-Receptor File (File extension *.src)

The source-receptor file (often called an SRC file) is a file that is created by HARP when you run the dispersion analysis. It contains a list of all of the sources (stacks) and receptors that were used in the ISC input, as well as details about those sources and receptors that are necessary to complete the risk analysis.

To perform a risk analysis, HARP uses the X/Q values (see section 10.4.5 for a definition of X/Q) provided by ISC (see sections 9.11 and 9.12 for instructions on setting up and running the dispersion analysis using ISC). The X/Q values are combined with the emission rates (usually taken directly from the emissions database) to determine ground level concentrations (GLCs) of each of the pollutants. A source-receptor file is required to perform a risk analysis because the normal ISC input and output files do not contain sufficient information to determine which sources in the dispersion results correspond to which stacks in the database. Without this information, HARP cannot determine emission rates. The ISC input and output files also lack descriptive information about the receptors. The SRC file contains information that allows HARP to distinguish between grid receptors, boundary receptors, census block receptors, and so forth.

Most users will never have to look at or understand the contents of an SRC file. However, you should know that: 1) it is an intermediate file that links the results of the dispersion analysis with the contents of the emissions database and subsequently with the risk analysis; 2) that you must have an SRC file in order to perform the risk analysis; and 3) that the SRC file is created automatically when you run the dispersion analysis.

When you first open the risk window, the next step is to open an SRC file. When you run a dispersion analysis for your project the SRC file will be saved in your project directory. To open an SRC file select ***Files/Open Source-Receptor File (Dispersion analysis results)*** from the menu on the risk window. Use the browser to select an existing SRC file.

Source-receptor files always have an extension of SRC. The full name of the file is determined by the name of the ISC input file that you specified when running the dispersion analysis. For example, if you specified that the ISC input file should be called DEMO.INP then the corresponding SRC file will be called DEMO.SRC. Thus all input and output files generated by a single run of the dispersion analysis will have the same root name but different extensions.

10.4.7 Risk File (File extension *.rsk)

The risk file is an intermediate file that is created each time you calculate point-estimate risk for multiple receptors (see section 10.6). It contains the most recently calculated values of cancer, chronic and acute risk. These are the same values that appear on the Risk tab of the risk window. The risk file is always has the same root name as the ISC input file and an extension of .RSK.

The purpose of this file is to save risk values that you have calculated so that the next time you run the program you can resume where you left off, view the previous data on the map, and generate new contours.

Each time you open a source-receptor file (see section 10.4.6) HARP will ask if you would like to load the corresponding RSK file. You will be warned if the file does not exist.

10.4.8 Map and DEM Files (File extension *.map and *.dem)

There are two types of files used by the HARP mapping functions. The street map files have an extension of .MAP. The map files contain Tiger street map data from the U.S. Census Bureau that can be read and displayed in the risk window.

Elevation data can be obtained in the form of DEM (Digital Elevation Model) files from the United States Geological Survey (USGS). This data can be utilized by HARP to simplify the determination of elevations of sources and receptors so that you do not have to enter elevations manually. This data can be used to help to set up the ISC input for uneven terrain and to determine the elevation of any stack or receptor. The DEM files have an extension of .DEM.

These files are described in more detail in section 9.13, and the map features of HARP are described in the rest of section 10.3.4.

10.4.9 Stochastic Analysis Files

There are several files that are used only for stochastic analysis. These are described in section 10.4.

10.5 Loading Data into the Risk Window

Before you can run a risk analysis, you must have already entered your emission inventory data into the HARP database (CEIDARS-Lite) and run an air dispersion analysis. The dispersion analysis will generate the X/Q and SRC files which contain the information required by the risk module. A tutorial is contained in Chapter 4 and Appendix A includes a "how to" guide that will facilitate HARP's risk analysis features.

10.5.1 Open the Risk Window

The main risk window can be opened by selecting ***Analysis/Risk Analysis*** from the main window. There are two choices in the menu depending on whether you intend to use screening meteorology data or representative meteorology data. Your choice will be depend on what meteorology you used in the dispersion analysis. If you used representative meteorology, you must choose ***Analysis/Risk Analysis (Representative Met Data)***.

10.5.2 Open a Source-Receptor File

When you run the dispersion analysis a source-receptor file is always generated (see section 10.4.6). You must have this source receptor file in order to proceed with the risk analysis.

The first step in the risk analysis is therefore to open the source receptor file. This is done by selecting ***Files/Open Source-Receptor File*** (***Dispersion Results)*** from the menu of the risk window.

Several things happen when you open a source-receptor file. The source and receptor details are read from the SRC file and displayed on the various tabs in the data view window. The average and maximum X/Q values are read from the XOQ file and displayed under the X/Q tab. HARP then goes to the emissions inventory database and looks up the process and chemical emission rates for all processes that are connected to the stacks that were specified in the dispersion analysis. This information is then displayed under the Emissions tab. HARP then uses all of this information to calculate the average and maximum values of GLC, and displays this information under the GLC tab.

When you open an SRC file, HARP also automatically attempts to open the risk file having the same root name. The purpose of this file is to save risk values that you have calculated so that the next time you run the program you can resume where you left off, view the previous data on the map and generate new contours (see section 10.4.7). If it cannot find the risk, file you will be warned. If it can find the risk file, then the cancer, chronic, and acute health risk values will be read from the file and displayed under the risk tab. The risk file only exists if you have previously performed one of the point-estimate analysis functions described in section 10.6.

10.5.3 Calculating GLC

In order to calculate risk you must know the ground level concentrations (GLC) at each of the receptors for each of the chemicals. GLCs are calculated by multiplying the emission rates by the X/Qs for each stack, receptor and chemical and summing for each receptor. This is normally done automatically by HARP when you open a source-receptor file.

GLCs can also be calculated manually by selecting ***Analysis/Recalculate GLC*** from the risk window menu. You would use this approach if you manually edit the emission rates rather than using the values that are automatically imported from the database.

10.5.3.1 Adding a Substance-Specific GLC as a Background Concentration

There may be a time when you would like to run a risk analysis with a GLC value for one or more substances from an outside air dispersion run. There are two paths described below that can be used to achieve this analysis.

The first method will allow you add a GLC for each substance across an entire receptor grid and run a multipathway point-estimate risk analysis. This method could be used for evaluating the contribution of background pollutants. Substance - specific GLC values can be added through the emissions information in the risk window as a background concentration. The GLC value that you enter will be applied to every receptor in the file as a background concentration.

From the main risk window, open any SRC file from your project or open the SRC file for the tutorial. This file will provide a surrogate receptor grid and SRC file. This file will serve as a template when inserting your background GLC value. Click on the ***Emissions tab***. You will need to add and delete chemicals to match the analysis you want to run by using the buttons at the top of the emissions window. For each substance insert the GLC value as the background concentration, insert a one (1) into the multiplier row, and blank out the source emissions row for each substance. Then set-up and evaluate your point estimate risk analysis (Section 10.6). Additional information can be found in Appendix A.

The second method will allow you to analyze a single receptor only, but you can enter different GLC values for the target receptor and each of the three pathway receptors. This second method will allow you to run a multipathway point-estimate or stochastic analysis. To perform the second method, see section 10.7.2.2.1 or Appendix A.

Currently, HARP cannot directly accept the output from an air dispersion-modeling run that was performed outside of the HARP Software.

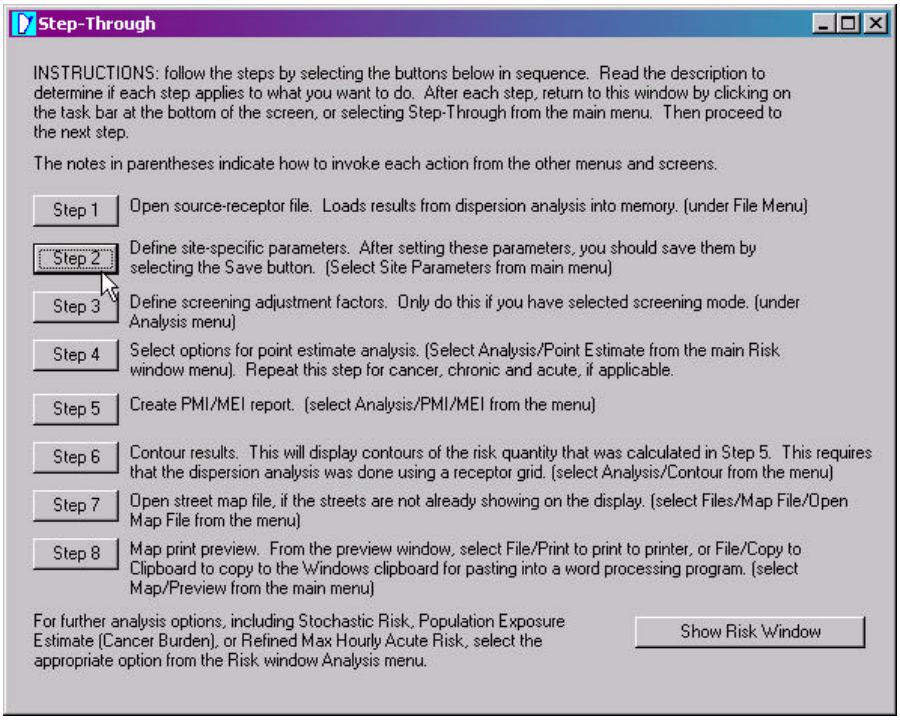
10.5.4 Displaying X/Q and GLC Details

When the number of receptors is very large (in the neighborhood of 5 or 10 thousand receptors or more) the display of the GLC and X/Q values takes a large amount of time. To speed up the loading of the SRC file and the subsequent calculations, HARP will automatically hide the X/Q and GLC values. When you want these values to be displayed, uncheck the menu item under ***Options/Display GLC and X/Q Details***. When this item is checked, the GLC and X/Q values will be displayed immediately.

10.6 Setting-up a Point-estimate Risk Analysis

10.6.1 Simplified Risk Analysis/Step-Through

To simplify the risk analysis process for new users, all of the most common functions can be performed from a single window, call the Step-Through window. To display the Step-Through window, select ***Step-Through*** from the Risk window menu. The window is shown below.

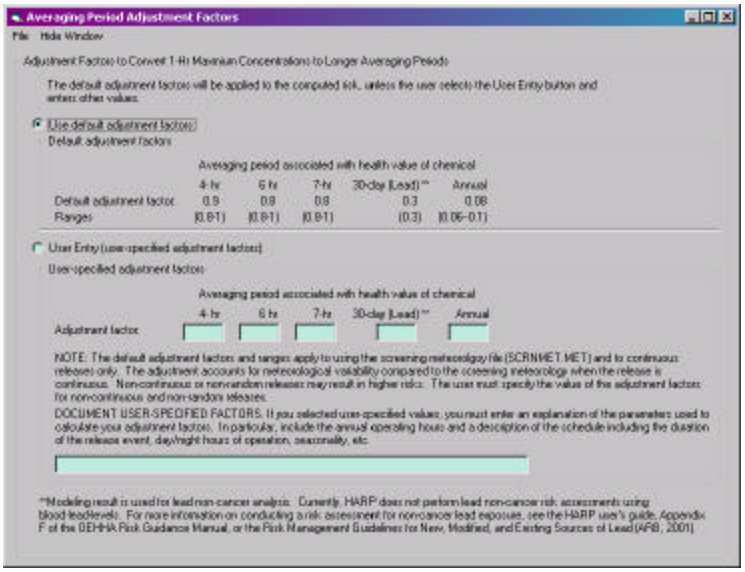


Click each of the buttons in sequence to perform each task. The explanation of what each button will do is shown on the window. The parenthetical portion of each button explanation indicates how you could perform the same function through the menus.

10.6.2 Screening Meteorology/Averaging Period Adjustment Factors

If you choose the screening meteorology option when you open the HARP Risk window, HARP will expect that the dispersion results that are being used for the risk analysis were done with screening meteorological data. If not, you will receive a warning message.

When you use screening meteorological data for the air dispersion analysis the result is a maximum one-hour X/Q value. U.S. EPA adjustment factors can be applied to estimate concentrations for longer averaging periods, such as the maximum annual average concentration. Appendix H in this manual and Appendix H in the OEHHA Guideline Document contain further information on the use of adjustment factors. To adjust the air dispersion modeling results to longer averaging periods select ***Analysis/Define Averaging Period Adjustment Factors for Screening Meteorology*** from the menu of the Risk window. The following window will appear.



In this window you choose whether you will use the default adjustment factors or define your own. If you check the button labeled "*use default adjustment factors*", HARP will assume that the source operates continuously and will use the adjustment factors shown, which are the values recommended by ARB and U.S. EPA for continuous sources.

If you check the button labeled "*User Entry*", then you may provide your own adjustment factors. In this case, you must also justify the user-defined adjustment factor in the box at the bottom of the window. Note, the adjustment factors for longer averaging periods do not need to be prorated for the emissions schedule as explained in Appendix H in the OEHHA Guideline Document. The purpose of the emission operating schedule factor in Appendix H is to pro-rate the actual emission rate to an annualized emission rate for the facility. HARP distributes annual emissions (lbs/yr) to hourly emissions (g/s) based continuous emissions (8760 hrs/yr). Therefore the annual emissions are automatically pro-rated over a year in the event that actual emission schedules are less (e.g., 2000 hrs/yr). Immediately after exiting this window you must recalculate the GLCs or the GLCs will be updated when the risk is calculated. Do this by selecting ***Analysis/Recalculate GLC*** from the main risk menu.

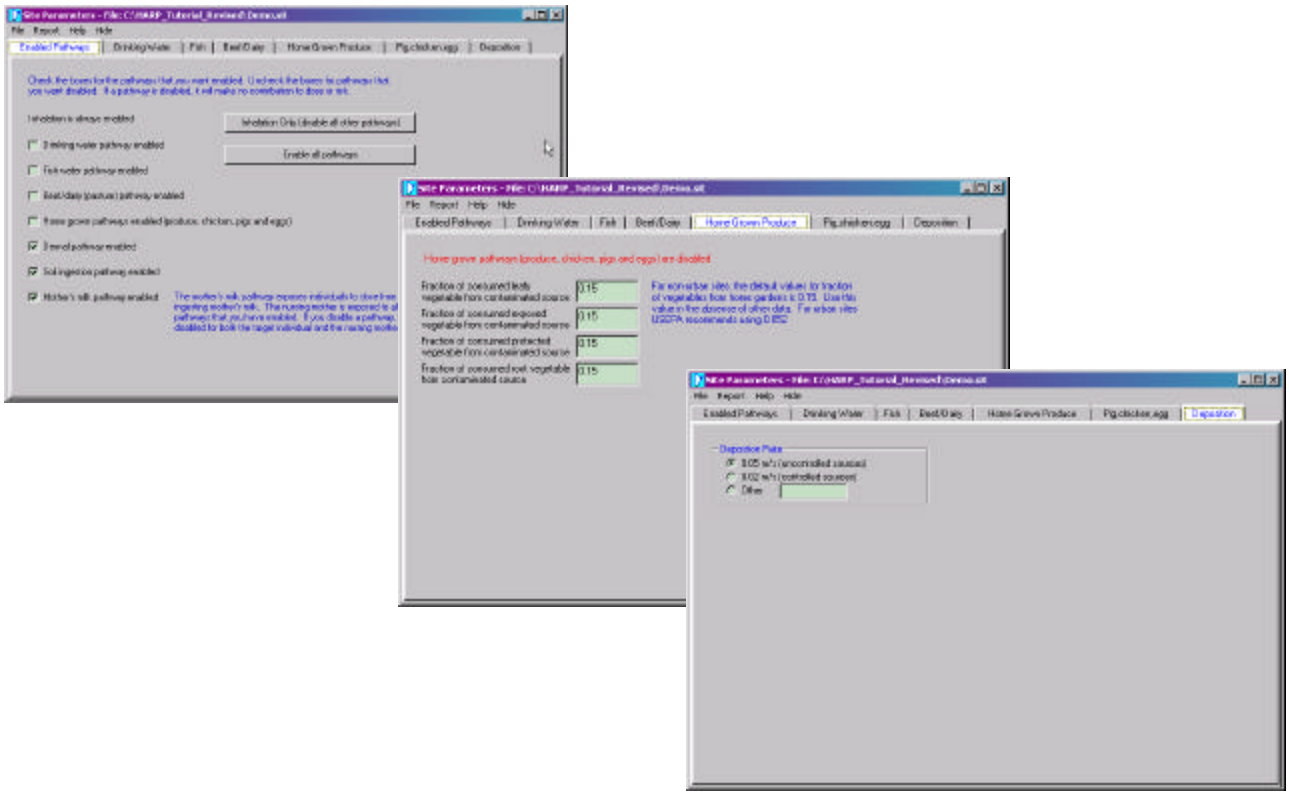
10.6.3 Site Parameters Window

The Site Parameters window allows an assessor to specify which exposure pathways will be included in the health risk assessment (HRA) analysis. These windows are used in <u>all</u> HRAs.

In the first window shown below (upper–left), an assessor will select the pathway(s) they will evaluate or enable in the HRA. Once the pathway(s) are enabled, the assessor will select the corresponding tab for each enabled pathway at the top of this screen. Selecting a tab in this first screen will open a second screen (center window) that contains site-specific questions that must be answered by the assessor for that exposure pathway. Questions included in these tabs inquire about site-specific physical characteristics of the exposed media and the frequency of exposure to that media or products consumed through that exposure pathway. Site-specific information is

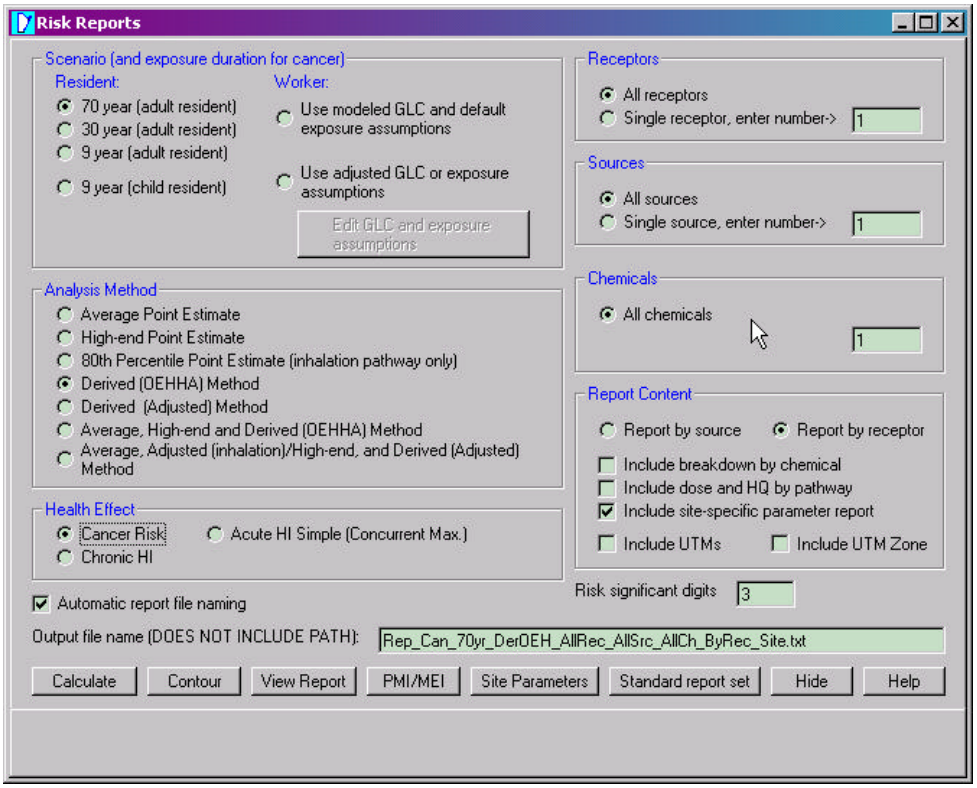
required for all exposure pathways except for the inhalation, dermal exposure, soil ingestion, and breast milk exposure pathways.

The deposition tab shown in the Site Parameters window should be selected for all assessments that include any non-inhalation exposure pathways (e.g., soil or fish ingestion pathways). This tab will ask you questions about the deposition rate of the particulate emissions from the emission source (lower-right). See the OEHHA Guidance Manual for more information about deposition rates.



10.6.4 Calculating Risk and Viewing a Reports

The Risk Reports window controls point-estimate risk reports. This window is displayed when you select ***Analysis/Point-estimate (Includes Multipathway)*** from the risk window. The Risk Reports window appears as shown below. This screen will allow a user to perform a Tier-1 risk assessment as described in the OEHHA Guidance Manual. In addition to using the point-estimates of exposure supplied in the OEHHA Guidance Manual, HARP users may input their own appropriately supported point-estimates or data distributions by editing the network. For more information on adding user-supplied data into the network to perform a Tier-2 or Tier-4 risk assessment, see sections 10.7.6.1, 10.7.6.4, and 10.7.6.5.



RISK REPORTS WINDOW

To create a report, select the report options as described in the following sections, then press the *Calculate* button. Users of the HARP software are assumed to have a working understanding of the risk assessment methods and procedures outlined in the OEHHA Guidance Manual.

When you generate a report, the report is written to a file, whose name you specify in the box labeled *Output File Name.* The file will always be located in the project directory.

The report may be viewed by pressing the button labeled ***View Report***. Because the report is an ASCII file, it can also be opened or imported into any word processor.

10.6.5 Report Options

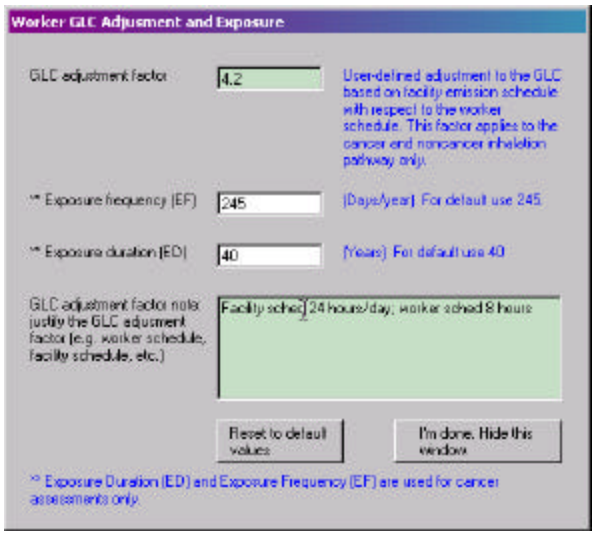
10.6.5.1 Scenarios

On the Risk Reports window, you may select one of two scenarios, either a residential (adult or child) receptor or a worker receptor. For a residential receptor you can select which exposure duration you wish to use in your analysis; 9, 30, or 70 years for an adult or 9 years for a child.

For the impacted worker, you can make selections based on how the modeling input characterized the timing of emissions from the source as compared the worker's schedule. In addition, there is a location input to identify variation in a worker's schedule (e.g., working

lifetime). Depending on your choice of how you wish to analyze the worker, you may be asked to supply information for the analysis (see screen below).

You will need to determine whether the air dispersion modeling run for the residential receptor is also appropriate for the worker's inhalation analysis. See Chapter 8 of OEHHA's Guidance Manual for more information on worker exposure. If the modeling run is appropriate for both receptors, you will select *"Use Modeled GLC and Default Exposure Assumptions"* and no further information will be required. If the modeled GLC for the residential receptor is not representative of the workers' inhalation exposure then you should either remodel the impacts (see chapter 9 on Dispersion Modeling) or adjust the GLC (upward) using a factor to approximate a more appropriate GLC. If you select the second button, *"Adjust the GLC or the Exposure Assumptions*", you will get a second screen. On that second screen, you can supply an adjustment factor used to approximate the GLC (applies to the inhalation pathway only) or change the standard exposure assumptions for the worker. If you provide a factor for to change the GLC or change an exposure assumption, you will be required to supply information explaining the basis for your change in the note window before you leave this screen. This information and your changes for the worker will appear in the output file (printed report).



10.6.5.2 Analysis Method

The Analysis Method toggles allow the use of various point-estimates of exposure and two methods for determining multipathway health impacts. The input parameters used here are presented in the OEHHA Guidance Manual and also reflect the *Air Resources Board's Recommended Interim Risk Management Policy for Inhalation-Based Residential Cancer Risk (October 2003)*. The analysis method does not apply to acute risk. The acute risk results will be the same regardless of which analysis method you choose.

HARP users may input their own appropriately supported point-estimates or data distributions by editing the network. For more information on adding user-supplied data into the network to perform a Tier-2 or Tier-4 risk assessment, see sections 10.7.6.1, 10.7.6.4, and 10.7.6.5.

10.6.5.3 Health Effect

You may choose one of three health effects: cancer, chronic or acute. The report will be generated only for the health effect that you choose.

Note: when you select either chronic or acute, both are actually calculated, but the printed report is output for only the one you select. Regardless of whether you pick chronic or acute, the results for both will be displayed under the risk tab and will become available for contouring.

10.6.5.4 Receptors

You have a choice of generating a report for all receptors or for only a single receptor. If you choose a single receptor then you must specify the receptor number. Receptor numbers are shown on each of the receptor detail lists under the receptor tabs on the risk window.

You would generally select a single receptor in combination with the *Report by Source* option in order to produce a detailed breakdown of the contribution of risk from multiple sources.

WARNING: If you select all receptors in combination with ***Report by Source***, the report may be very long and will take some time to generate.

10.6.5.5 Sources

You have a choice of generating a report for all sources or for only a single source. If you choose a single source then you must specify the source number.

You would generally select single source in combination with the *Report by Receptor* option in order calculate risk from that source for all receptors in an area.

10.6.5.6 Chemicals

You have the choice of generating a report for all chemicals or for only a single chemical. If you choose a single chemical you must enter the chemical number.

Note that the chemical number is not the CAS number, but rather the index of the chemical as shown under the emissions tab.

10.6.5.7 Report Content

The options of *Report by Receptor* or *Report by Source* determine the format and content of the report.

If you select *Report by Receptor*, then the receptors are listed down the left column of the report, with pathways and endpoints across the top. The risk values are for a single source or all sources depending on what you selected under the source option.

If you select Report by Source, then the sources are listed down the left column of the report, with pathways and endpoints across the top. You would generally do this for only a single receptor. If you select Report by Source for all receptors, the report may be quite long.

There are quite a lot of combinations of the parameters described in this section, and consequently there are many different types of reports. The best way to familiarize yourself with the content of these reports is to experiment with different options.

10.6.5.8 Output File Name

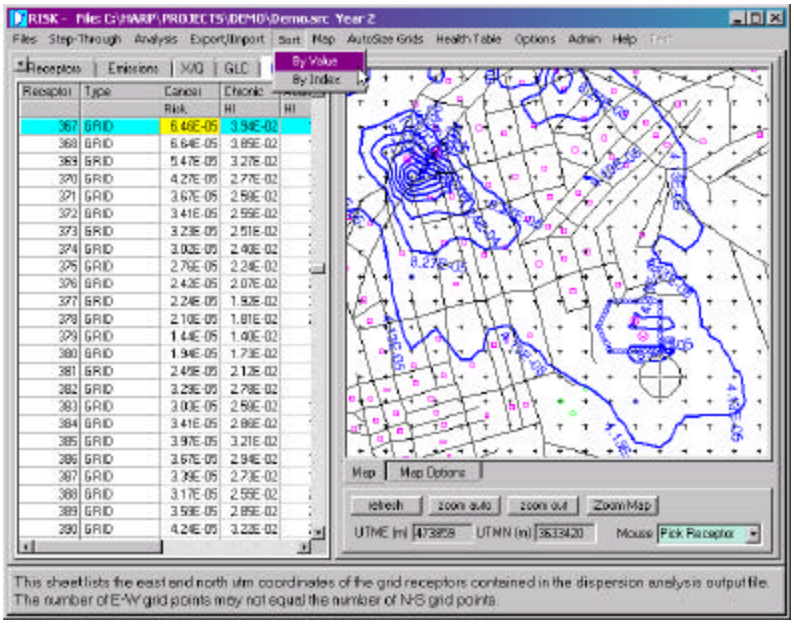
Whenever you generate a report, the report is output to an ASCII file that will be in your project directory. The reason for outputting to an ASCII file is to make it easy for you to incorporate these reports into a word processor. HARP will automatically name the file according to the buttons you choose when you set-up your risk scenario. You can turn off the automatic file-naming feature by clicking in the check box next to *Automatic File Naming*. You can change the name of the file if you wish by entering the name in the box labeled *Output File Name*.

10.6.5.9 Standard Report Set

If you need to send the results of your risk analysis to OEHHA for review, you will be asked to send a set of specific HARP files and risk reports. To make this easy on the risk assessor, HARP has a button labeled, *Standard Report Set* on the risk reports window. By pressing this button HARP will automatically generate the required reports and save them in your project directory. This set of reports can then be written to a CD with the other required files and mailed to OEHHA for their review. Because of the number of reports, this takes substantially longer to run than the individual cancer, chronic, and acute reports. A list of the files in the Standard Report Set can be found in Appendix G. For information on what OEHHA requires in a risk assessment that is to be submitted for their review, please see the OEHHA Guidance Manual.

10.6.6 Viewing and Sorting Tabular Risk Results

When you calculate your point-estimate risk scenario (by selecting *Calculate* button on the Risk Reports window) HARP generates an ASCII file containing the report, and also displays the results in a list under the Risk tab of the risk window. This is illustrated below.



RISK DETAILS TAB

The left two columns show the receptor numbers and receptor types. The three right-hand columns show the cancer risk (non-dimensional) and the chronic and acute health hazard indices.

Note: After calculating the cancer risk or the chronic noncancer health impacts, the situation may exist where the results show a potential health impact for some property boundary receptors, but those same receptor locations have a GLC of zero (0). This situation exists because an adjacent building (through the building downwash calculation) is precluding a GLC from being computed at the property boundary location. If you wish to disable downwash option, go to the *Control* window under Dispersion Modeling and turn it off, then rerun the dispersion modeling analysis (see Section 9.12.2.1).

With the downwash algorithm activated, the cancer risk or chronic noncancer impact that is shown at the property boundary receptor is from contributions through the water, pasture, or fish pathways. To zero out the risk at these locations, return to the Dispersion Modeling module, turn these pathway receptors off and rerun the dispersion-modeling run (see the Pathway Receptors Worksheet discussed in Section 9.12.8).

You can sort the rows in this table by clicking on one of the three columns and then selecting ***Sort/By Value*** from the menu. The rows will be reordered with the highest risk values at the top. To return to the normal display order, select ***Sort/By Index*** from the menu. The rows will be reordered by receptor number.

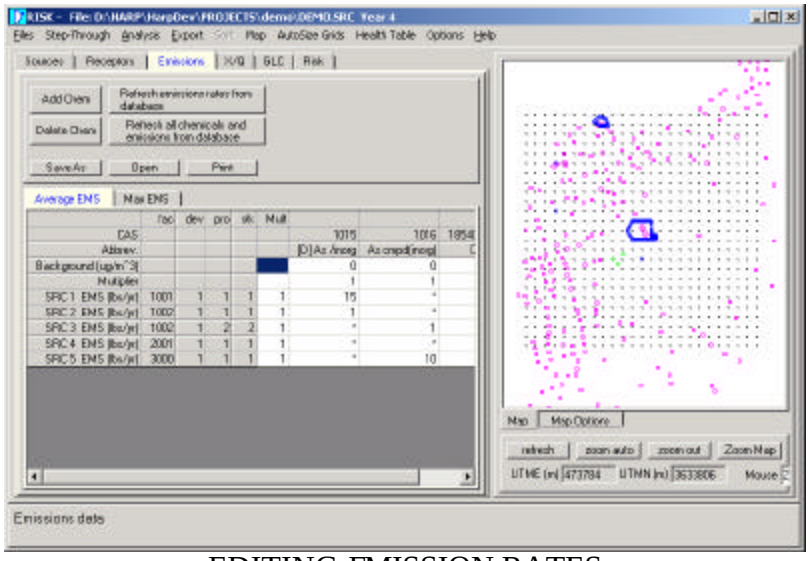
When you click on any row of this table, the corresponding receptor is highlighted with a circle and a cross hair, as illustrated above. Conversely, if you have the mouse mode set to *Pick Receptor*, and you click on a receptor on the map, the corresponding row in the receptor list will be highlighted.

10.6.7 Modifying Emissions ("What-if" analysis)

You may wish to perform the risk analysis using emission rate values that are different from the ones contained in the emission inventory database. HARP allows you to do this by editing the emission rates used in the risk analysis. This allows you to answer "what if" questions, such as what if the emission rate for a particular chemical or a particular process were increased or decreased. You may also examine how the risk would change if a chemical were deleted or a new chemical were added.

Cells containing an asterisk (*) indicate that there is no emission rate stored in the database for that chemical and process. You may replace the asterisk (*) with a value if you want to specify an emission rate.

The row in the table labeled *Background*, may be used to enter the background concentration (micrograms/m^3) for each chemical. The background concentration is added to every receptor. See section 10.5.3.1 for more information.



EDITING EMISSION RATES

10.6.7.1 Adding and Deleting Chemicals

You may add a new chemical to the table by pressing the ***Add Chem*** button. You will be prompted with a list of available chemicals. This list reflects all substances that are included in the Emission Inventory Criteria and Guidelines (EICG) that have OEHHA health factors. When you select one the chemicals it will be added to the table. In addition, HARP also contains all health factors listed in the OEHHA Guidance Manual (even if the substance is not listed in the EICG document). These substances can be added to a risk analysis by typing the substance name or CAS number directly into the Add Chemicals window. You must then fill in the emission rate values manually.

To delete a chemical from the table, click on the column containing the chemical you want to delete, then click the ***Delete Chem*** button.

10.6.7.2 Changing Emission Rates

When you first open a source-receptor file, HARP builds a table of emission rates by first reading the list of stacks from the SRC file, then looking in the emission inventory database to find the emission rates for all processes connected to those stacks. The results are displayed under the Emissions tab of the risk window.

You can modify the emission rates used in the risk analysis without returning to the emissions inventory database. This is done by selecting the Emissions tab on the risk window and editing the emission rates directly in the cells where they are shown. Changes that you make here will not be reflected in the database.

Note that under the Emission tab there are sub-tabs for average and maximum rates. You must edit the values under both of these tabs if you intend to do both cancer and noncancer analyses. The average emission rates are used for cancer and chronic risk analysis. The maximum emission rate is used for acute risk analysis.

After you have made changes to the emission rates, you must recalculate the GLCs by selecting ***Analysis/Recalculate GLCs*** from the menu. This recalculates the GLC values that will be used in the multipathway risk and displays the new values under the GLC tab.

10.6.7.3 Scaling Emission Rates

Under the Emissions tab on the risk window, the columns and rows labeled *Mult* are user-defined multipliers that you can change if you want to attenuate the emission rate of any chemical or process by some factor to see what the effect on risk would be. The default value for all the multipliers is 1. Each emission rate is multiplied by both the chemical scaling factor and the process scaling factor before it is used in the analysis. This can be used to artificially attenuate a particular process or chemical. This has the same effect as editing the individual emission rates in a row or column, but is simpler.

For example, if you want to find out how the risk would be affected by reducing a particular process rate by 50%, locate the row corresponding to that process and set the value of the scaling factor under the *Mult* column to 0.5. To determine how the risk would be affected by reducing the emissions of a particular chemical from all processes by 50%, locate the column for that chemical and set the chemical scaling factor in the *Mult* row to 0.5.

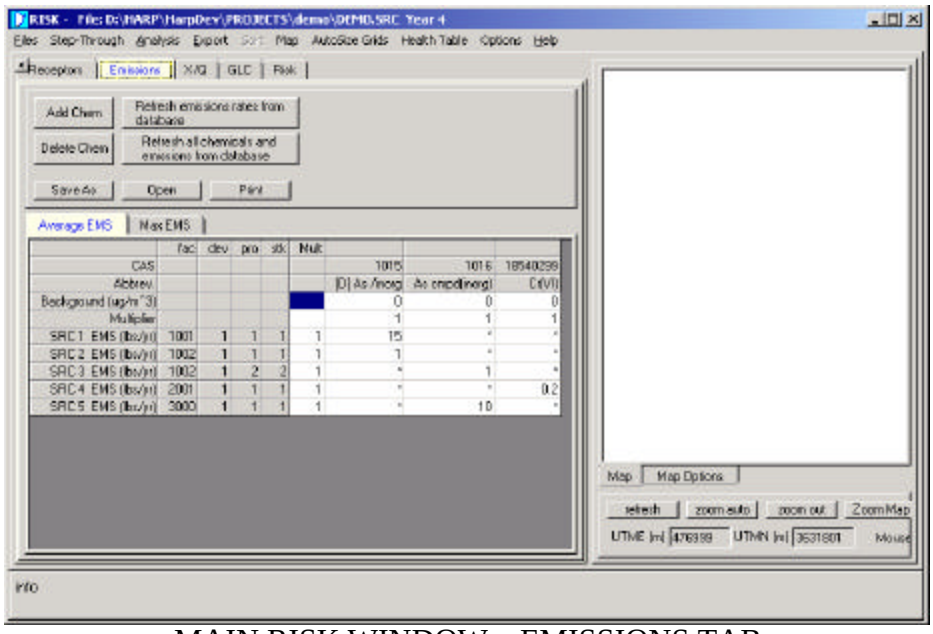
After you have made changes to the emission rates, you must recalculate the GLCs by selecting ***Analysis/Recalculate GLCs*** from the menu. This recalculates the GLC values that will be used in the multipathway risk and displays the new values under the GLC tab.

10.6.7.4 Restoring Emission Rates from Database

If you want to revert to the original emission rates as they are recorded in the database, select ***Data/Fetch Emission Rates*** from the menu. This will wipe out any changes that you have made and return the display to where you started.

10.6.7.5 Reading From or Saving the Emissions Table

Recall from the picture below that on the risk window the emissions of each chemical from each stack are shown under the emissions tab. These values are normally imported automatically from the emissions database. But they can also be edited manually, and chemicals may be added or deleted from this list. Whatever chemicals and emission rates are shown in this window is used in all subsequent risk analysis.



MAIN RISK WINDOW – EMISSIONS TAB

The emissions table can be saved to a file, or read from a file. The emissions table file has an .EMS extension. It is a comma-delimited file, whose format is described below.

The emissions table file contains a cell-by-cell dump of the contents of the emissions table exactly as it is shown in the window above.

The number 10 in the first cell indicates that the table has 10 rows. You may count the rows above to verify that this is the case. The number 9 in the second cell indicates that the table has 9 columns. Each of the remaining rows contains the contents of one of the cells in the 10 x 9 grid.

The number in the first column indicates which sheet the cell belongs to. A value of 1 means the cell is on the Average EMS tab. A value of 2 indicates that the cell is on the Max

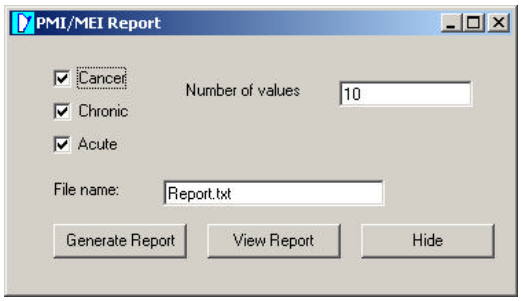
EMS tab above. The numbers in the second column are the row number, starting with zero for the first row. The numbers in the third column are the column number, starting with zero for the first column. The values in the fourth column below contain the contents of each of the cells.

The table below must match the structure of the table shown in the window above. In other words, there must be the same number of header rows and header columns as shown. The emissions data itself always starts in the sixth row and seventh column. You can verify that this is true by comparing the values below with the contents of the table above.

10			
9			
1	0	0	
1	0	1	fac
1	0	2	dev
1	0	3	pro
1	0	4	stk
1	0	5	Mult
1	0	6	
1	0	7	
1	0	8	
1	1	0	CAS
1	1	1	
1	1	2	
1	1	3	
1	1	4	
1	1	5	
1	1	6	1015
1	1	7	1016
1	1	8	18540299
1	2	0	Abbrev.
1	2	1	
1	2	2	
1	2	3	
1	2	4	
1	2	5	
1	2	6	[D] As /inorg
1	2	7	As cmpd(inorg)
1	2	8	Cr(VI)
1	3	0	Background (ug/m^3)
1	3	1	
1	3	2	
1	3	3	
1	3	4	
1	3	5	
1	3	6	0
1	3	7	0
1	3	8	0
1	4	0	Multiplier
1	4	1	
1	4	2	
1	4	3	
1	4	4	
1	4	5	
1	4	6	1
1	4	7	1
1	4	8	1
1	5	0	SRC 1 EMS (lbs/yr)
1	5	1	1001
1	5	2	1
1	5	3	1
1	5	4	1
1	5	5	1
1	5	6	15
1	5	7	*
1	5	8	*

10.6.8 PMI/MEI

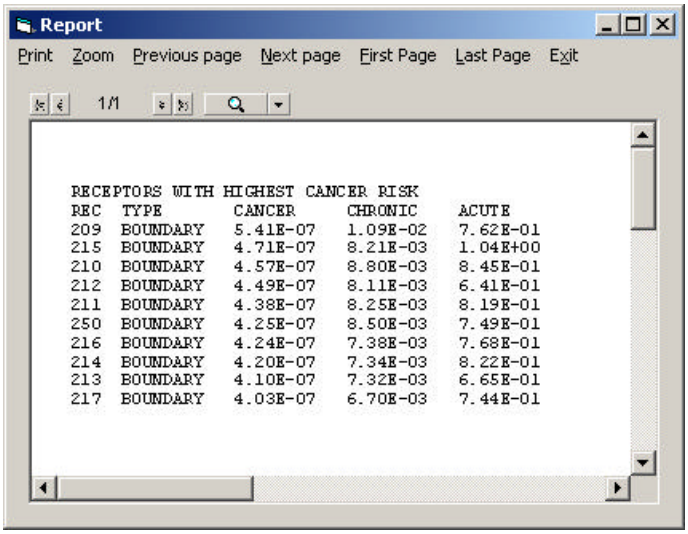
To produce a report that shows the Point of Maximum Impact and Maximum Exposed Individual (PMI/MEI), select ***Analysis/PMI/MEI*** from the menu. The following PMI/MEI report options window will appear.



From this window you can produce a report that lists the highest risk receptors in descending order of risk. These receptor points may be both inside and outside of the facility property boundary. Depending on the purpose (programmatic requirements) of your analysis or the nature of activities within the facility (e.g., prisons, universities, or military bases), care should be taken to be sure that the appropriate location for the PMI is reported. See the OEHHA Guidance Manual for information on when on-sight receptors may be appropriate under the Hot Spots Program. Assessors should understand the location of the PMI before automatically reporting the highest receptor as the PMI location.

The number of receptors listed is determined by the value that you enter in the box labeled *Number of Values*. You can generate a report for one or more of the three health effects by checking cancer, chronic and acute. The report will be written to an ASCII file located in the project directory. The name of the file is whatever you enter in the box labeled *File Name.*

When you are done selecting the options, press the button labeled *Generate Report*. To view the most recent report that you generated, press the button labeled *View Report*. The report window will appear similar to the following:



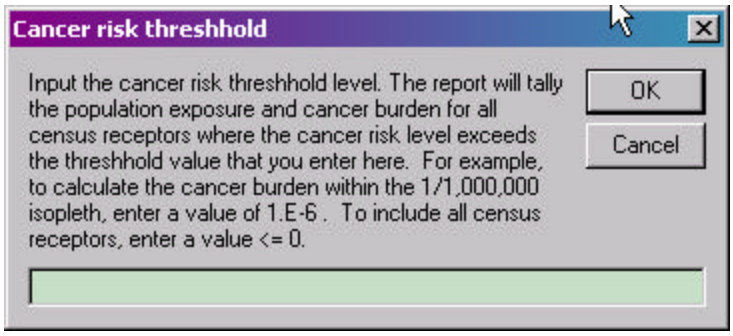
TYPICAL PMI/MEI REPORT FOR CANCER

This report is generated by checking the *Cancer* box in the report options window and setting the *number of values* to 10. The report lists 10 receptors with the highest cancer risk in order of risk. It also shows the corresponding chronic and acute risk for each of these receptors. If the cancer, chronic, and acute boxes were checked, a report for each health effect would be generated showing the list of receptors for each health effect.

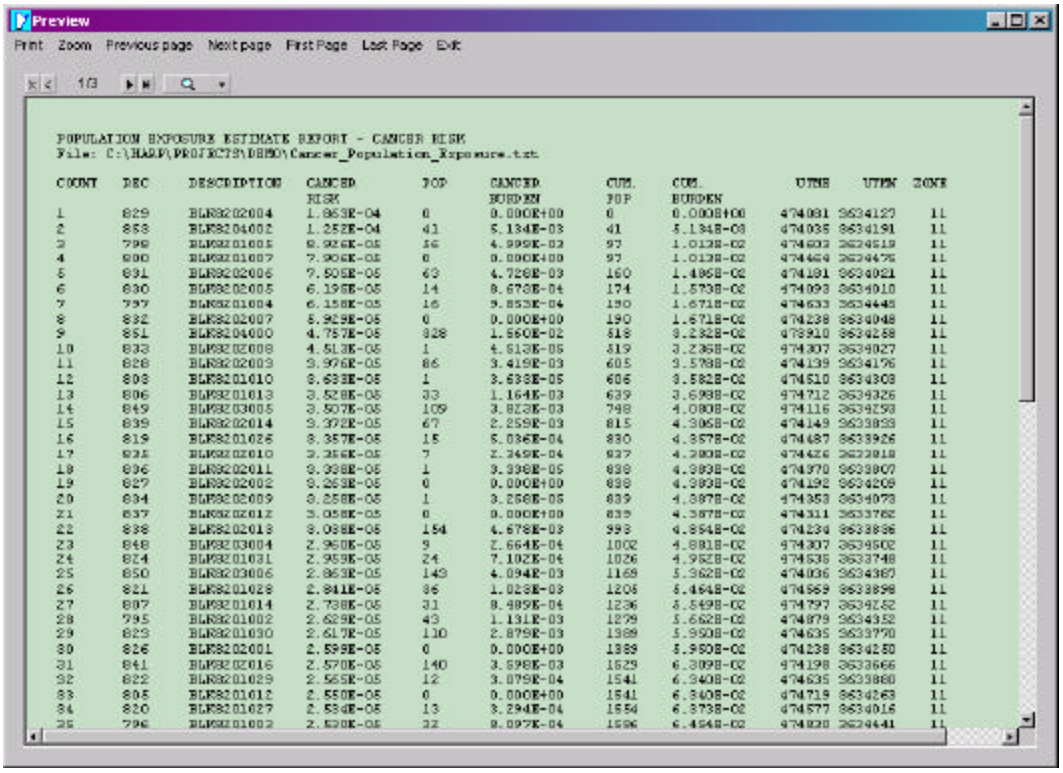
10.6.9 Population Exposure Estimates

10.6.9.1 Cancer Population Exposure Estimates and Cancer Burden

To calculate cancer burden select *Analysis/Population Exposure/Cancer Population Exposure Estimate and Cancer Burden* from the menu. The following window will appear:

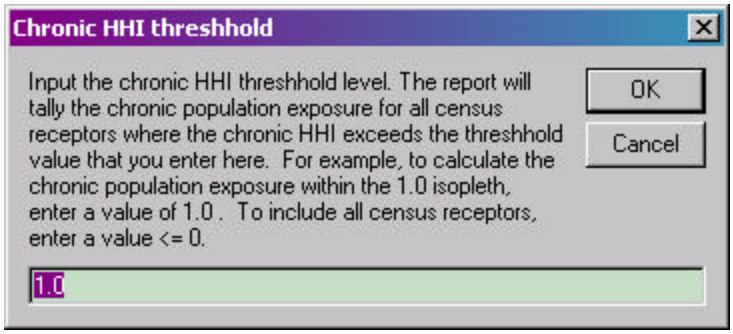


Input the cancer burden or risk thresholds as directed and press OK. The exposure assessment/cancer burden report will be written to a file and displayed in the Report window as shown below. The report consists of a list of all of the census block receptors whose cancer risk exceeds the threshold that you specify. The cancer burden for each of these receptors is calculated by multiplying the cancer risk by the residential population at each receptor. The total cancer burden is the sum of the cancer burden for each of the census receptors and is shown at the bottom of the report.

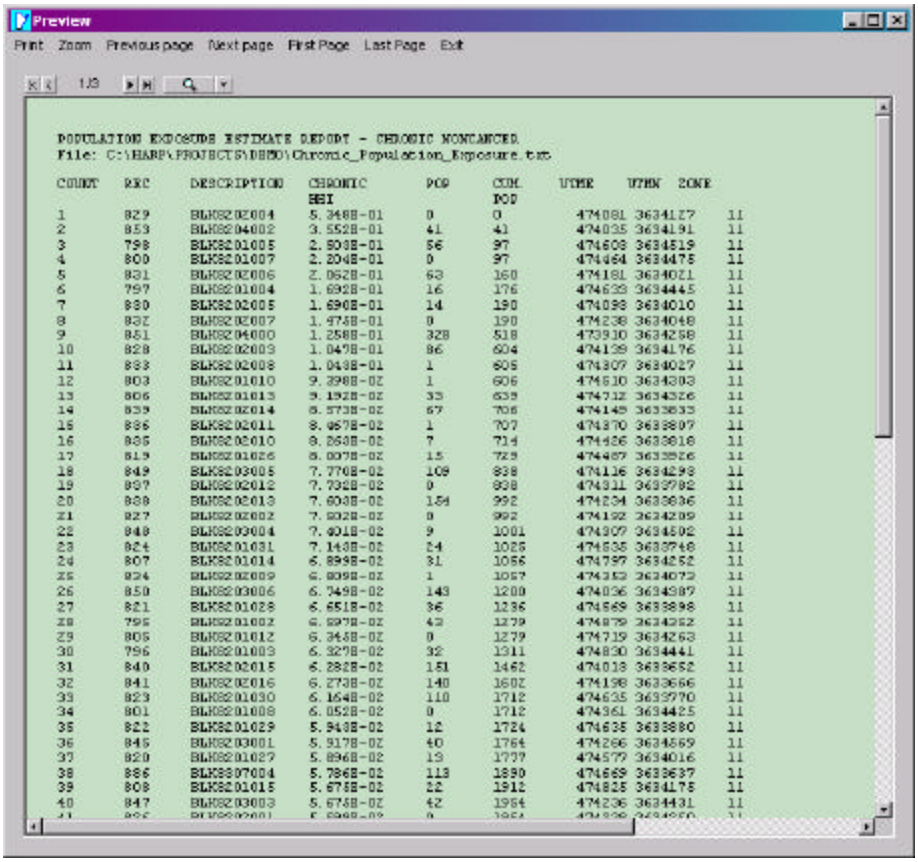


10.6.9.2 Population Exposure Estimates for Chronic Population

To calculate a population exposure estimate for the chronic noncancer hazard index select *Analysis/Population Exposure/Chronic Population Exposure* from the menu. The following window will appear:

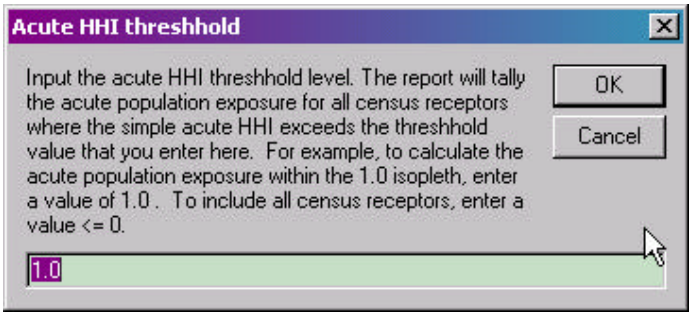


Input the chronic hazard index threshold as directed and press OK. The chronic noncancer exposure estimate report will be written to a file and displayed in the Report window as shown below. The report consists of a list of all census block receptors whose chronic hazard index exceeds the threshold that you specify.



10.6.9.3 Population Exposure Estimates for Acute (Estimated)

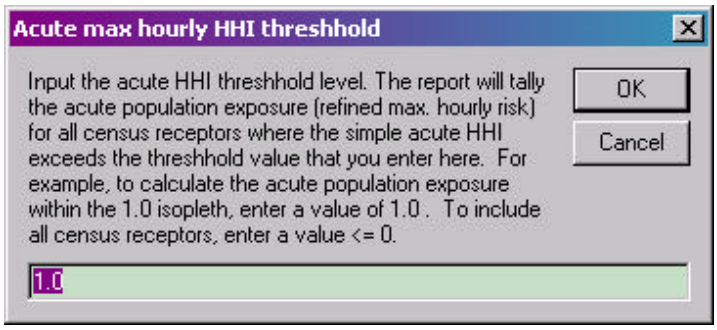
To calculate a population exposure estimate for the acute noncancer hazard index select *Analysis/Population Exposure/Acute Population Exposure (Estimated)* from the menu. The following window will appear:



Input the acute hazard index threshold as directed and press OK. The acute noncancer exposure estimate report will be written to a file and displayed in the Report window similar to the one shown (above) for the chronic noncancer hazard index. The report consists of a list of all census block receptors whose acute hazard index exceeds the threshold that you specify.

10.6.9.4 Population Exposure Estimates for Acute (Refined)

To calculate a population exposure estimate for the acute (refined) noncancer hazard index you must first have run the Refined Max Hourly Acute HHI analysis (see section 10.6.10.2). Once the Refined HHI analysis is complete, select *Analysis/Population Exposure/Acute Population Exposure (Refined)* from the menu. The following window will appear:



Input the acute hazard index threshold as directed and press OK. The acute noncancer exposure estimate report will be written to a file and displayed in the Report window similar to the one shown (above) for the chronic noncancer hazard index. The report consists of a list of all census block receptors whose acute hazard index exceeds the threshold that you specify.

10.6.10 Simple and Refined Acute Risk

10.6.10.1 Acute Risk (Simple)

HARP provides a very efficient way to estimate acute risk, which is referred to as simple acute risk. This method employs a timesaving approximation that is conservative in nature. Therefore, if you calculate the simple acute risk and find that the acute health hazard index (HHI) is less that 1, it may not be necessary to perform the more time consuming calculation of maximum hourly acute refined risk (see next section).

To calculate simple acute risk we assume that the X/Q at each receptor location and the emission rates from each source are at their maximum values at the same instant in time. This approximation allows us to simply use the maximum hourly X/Q for each source-receptor combination rather than considering the temporal variation of X/Q to calculate the GLCs. We then add the GLCs from all sources together at each receptor as if they had all occurred at the same time.

When you calculate acute risk from the risk reports window (see section 10.6.4), the simple acute risk approximation is made. If you find that the simple acute risk is high enough to warrant a more detailed analysis, you should calculate the refined maximum hourly acute health hazard index (HHI) (see section 10.6.10.2).

10.6.10.2 Refined Maximum Hourly Acute Risk

The maximum hourly acute risk refines the approximation used for the simple acute risk (see section 10.6.10.1). This is a more time consuming calculation, and is therefore usually done for a few receptors, typically the ones with the highest screening acute risk.

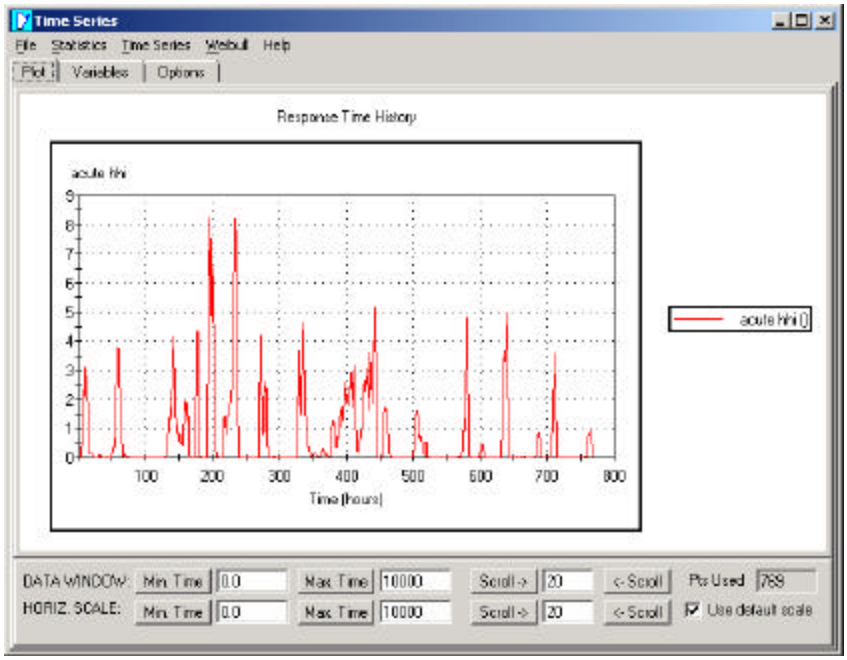
This calculation uses the hourly X/Q and the maximum emission rates from each source to calculate a GLC at each receptor location. Versus the simple approach, the refined approach allows us to consider the temporal variation of X/Q to calculate the GLCs. The GLCs from all sources are then added together to get the total GLC at that hour. From this the refined acute HHI is calculated. HARP then locates the maximum acute HHI over the time considered in the analysis.

This approach accounts for the fact that the X/Q from different sources will have a different time series and will not necessarily be at their maximums at the same time. This approach may produce a lower estimate of acute risk than the screening approximation. The refined method is still somewhat conservative because it uses the hourly maximum emission rate for every hour of the simulation rather than using time-distributed emission rates.

10.6.10.2.1 Refined Maximum Hourly Acute Risk for a Single Receptor

Before proceeding, be sure that you have opened an SRC file (see section 10.5.2).

To calculate maximum hourly acute risk for a single receptor, select ***Analysis/Refined Max Hourly Acute HHI*** from the menu. You will be prompted for the number of the receptor that you want to analyze. Enter the receptor number and press OK. After a few minutes the analysis will be completed and a window similar to the following will appear.



TIME SERIES OF ACUTE RISK

This window shows the time history of acute risk for the receptor you selected. From this plot you can see that the maximum value of acute risk HHI is 8.2, and that it occurs at 200 hours from the start of the simulation. Note that in the above example, the dispersion analysis was done for only 32 days for the purpose of demonstration. The length of the dispersion analysis determines the length of time for the maximum hourly acute risk analysis.

Under the *File* menu of this window there are options for printing this plot or copying it to the windows clipboard for insertion into a word processor. The *Statistics* menu item will create a simple table of statistics of the time series data. When you choose the *Statistics* option, you will be prompted for the file name. By default, it is called *stats.txt* and is located in your project directory.

Under the *Variables* tab, you can add (or delete) different variables to be plotted on the time series. Under the *Options* tab, you can change the location of the legend and choose whether or not symbols are drawn at each point on the plot or just lines without symbols. After making changes to the options or the variables to plot, click on ***Time Series*** to refresh the plot.

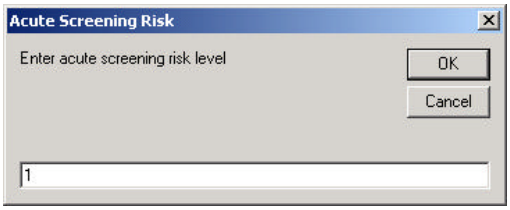
The *Min Time* and *Max Time* button at the bottom of the window, allow you to clip the graph to see just a small time range expanded. Set these values to some small range and refresh the plot by clicking the Time Series menu again.

To zoom into a specific area of the graph, hold down either the shift or control key while you drag the mouse around the area that you want to zoom into. To restore the graph to full view, press the lower case "r" key.

10.6.10.2.2 Refined Maximum Hourly Acute Risk for Multiple Receptors

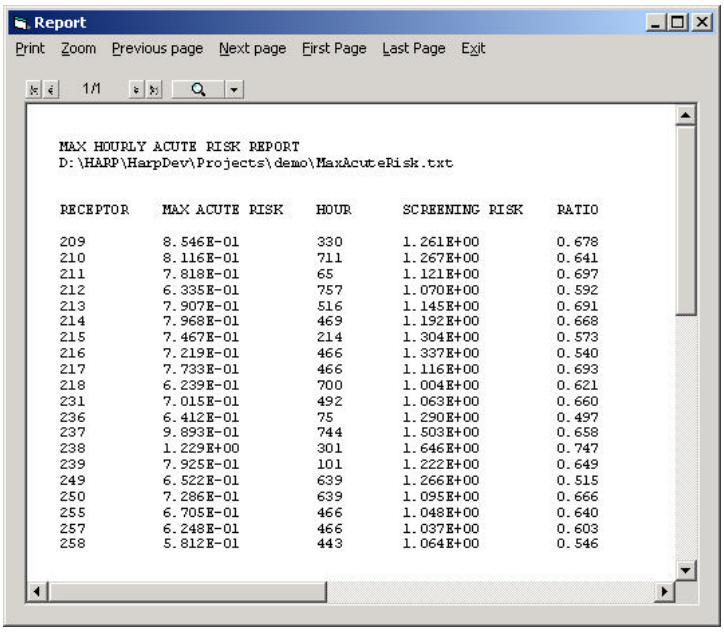
HARP has the ability to perform the maximum hourly acute risk analysis for a set of receptors and collect the results into a summary report.

From the risk window menu select ***Analysis/Max Hourly Acute HHI/All Receptors Within An Isopleth***. You will be prompted with the following window.



When you enter a value into this window and press OK, HARP will perform the maximum hourly acute risk analysis for all receptors whose screening acute risk value exceeds the number you specify. In the above example, the user has requested the analysis to be performed for all receptors having an acute HHI exceeding 1, based on the screening acute analysis.

You must first perform the acute screening risk analysis before executing this function. After the analysis is completed the resulting report window will appear as shown below.



The report shows the maximum hourly acute risk for each of the receptors exceeding the screening threshold and the hour at which the maximum occurred. The last two columns show the acute screening risk for each receptor and the ratio between the maximum hourly acute risk (refined) and the screening risk. Note that this ratio is always less than 1, which simply reflects the conservative nature of the screening risk.

10.6.10.2.3 Refined Maximum Hourly Acute Risk for All Grid Receptors

HARP has the ability to perform the maximum hourly acute (refined) risk analysis for all receptors and collect the results into a summary report. From the risk window menu select ***Analysis/Max Hourly Acute HHI/All Grid Receptors***. After the analysis is completed the resulting report window will appear as shown above for receptor within an isopleth. Depending on the complexity of the risk assessment (e.g., number or sources, receptors), this analysis may take some time to complete.

10.6.11 Creating Contours

HARP includes some mapping features that include placing contour lines (isopleths) over street maps. However, for detailed mapping problems, you may wish to export your data to a GIS mapping program (see Appendix M for export instructions).

From the ***Risk*** window, select ***Analysis/Contour***. Note that ***Contours*** window will appear, similar to that shown below. The contour isopleths are generated using **ONLY GRID RECEPTORS**. The number of contours should be one number greater that the number of intervals that you want your data divided into (i.e., if 5 intervals of data is desired, enter 6 contours). If HARP will not calculate the contours, there may not be enough data. At least three

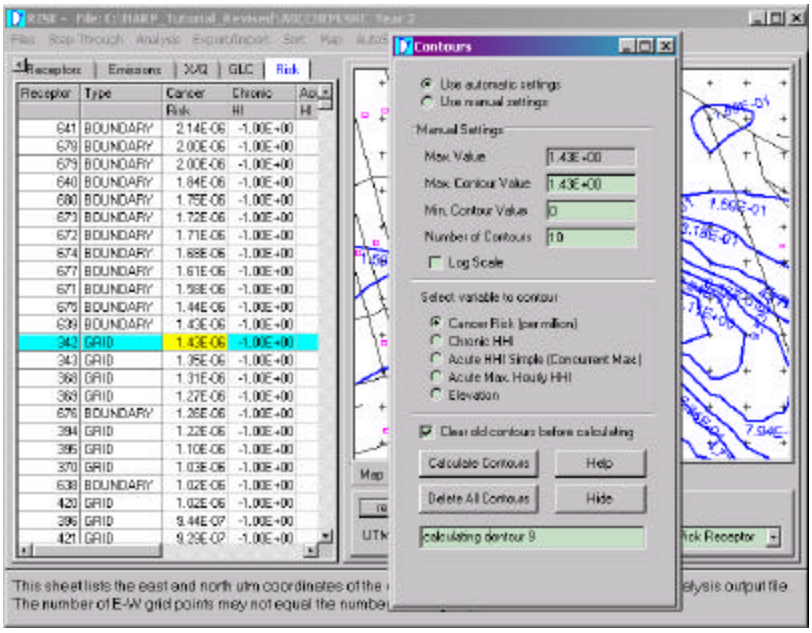
points of data (grid receptors) at that contour range are needed to make an isopleth. You should also look at your risk data to confirm that your maximum and minimum contour values are within the range of your data or you may need to rerun the dispersion analysis with smaller grid spacing.

To contour elevation from a loaded DEM file, select elevation. To contour risk, select either cancer, chronic or acute risk. Before generating risk contours you must first calculate the point-estimate risk for these health effects following the procedures in section 10.6.4.

HARP will plot the last risk that was calculated. So if you chose to run a risk analysis for "average, high-end, and derived", the risk contours that will be plotted will be for "derived". If you ran the OEHHA standard report set, HARP will plot the 70-year, cancer, derived (adjusted) scenario from Report #19. HARP plots contours in units of "per million."

10.6.11.1 Contouring With Automatic Settings

From the ***Risk*** window, select ***Analysis/Contour***. The ***Contours*** window will appear (shown below). Using the automatic settings will create contours that bound the risk data between the highest risk value and zero. Note that cancer risk contours are plotted in units of "per million". The number of contours that you define will divide the risk results into evenly spaced intervals between these two points. After supplying the needed information click on *"Calculate Contours"* and the mapped results will appear on the Risk window. To refine the look of the mapped isopleths (e.g. label frequency, font size) use the features under *"Map Options"*. The time required to create the contours is proportional to the number of contours and the square of the number of grid points. A 20x20 grid will take 16 times longer to contour than a 10x10 grid because it has four times as many grid points.



CONTOURING WITH AUTOMATIC SETTINGS

10.6.11.2 Contouring With Manual Settings

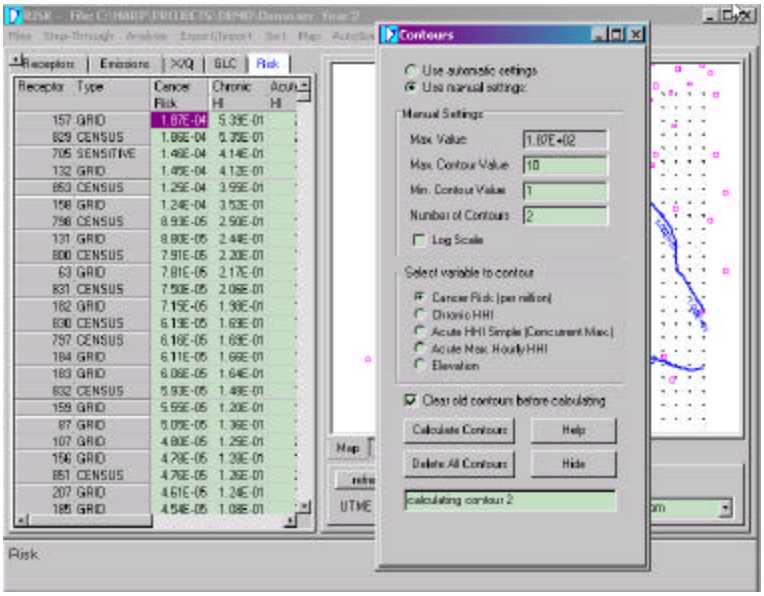
From the ***Risk*** window, select ***Analysis/Contour***. The ***Contours*** window will appear (shown above). If you wish to manually identify the contours, check the box (at the top of the window) "*Use Manual Setting*". By default, the box labeled "max value" will be populated with the highest cancer or noncancer health value for your analysis and the maximum contour level shown in the next box is set to the same value, while the minimum contour value is zero. Note that cancer risk contours are plotted in units of "per million".

Reset the maximum and minimum contour levels to reflect the levels that you would like shown as your maximum and minimum contour lines. Identify the number of contour lines you want to display. The number of contours that you define will divide the risk results into evenly spaced intervals between the maximum and minimum values. In most cases, the number of contours should be one number greater that the number of intervals that you want your data divided into (i.e., if 5 intervals of data is desired, enter 6 contours).

Note: if you want to see just two isopleths at, for example, 1 and 10 chances per million, set 10 for the maximum and 1 for the minimum contour values, and place a 2 in the slot for the number of contours. This same result can be achieved by checking the *"Log Scale"* box. The log scale box will provide the results at intervals of Log10.

After supplying the needed information click on *"Calculate Contours"* and the mapped results will appear on the Risk window. To refine the look of the mapped isopleths (e.g. label frequency, font size) use the features under *"Map Options"*.

The time required to create the contours is proportional to the number of contours and the square of the number of grid points. A 20x20 grid will take 16 times longer to contour than a 10x10 grid because it has four times as many grid points.

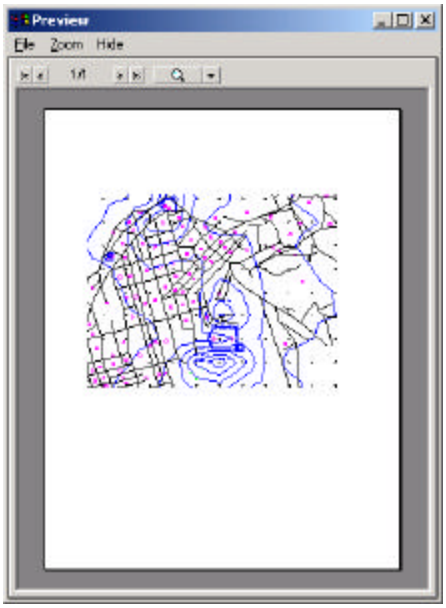


CONTOURING WITH MANUAL SETTINGS

10.6.12 Printing Maps

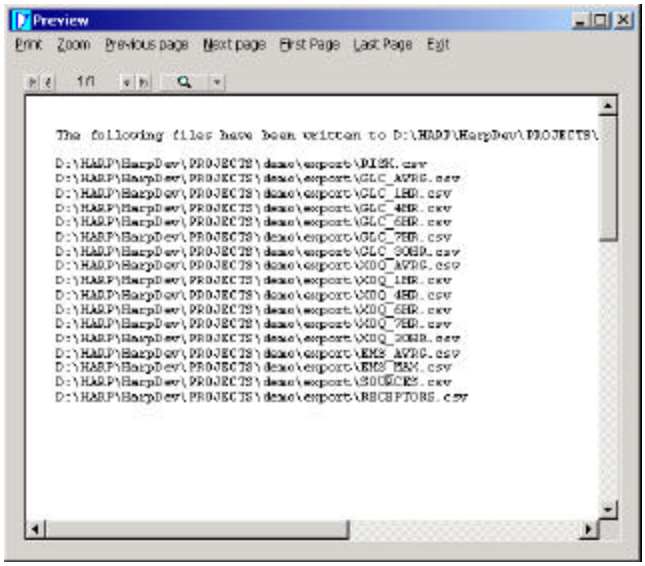
To print a map that is shown on the risk window, select ***Map/Print Preview*** from the menu. The print preview window will appear as shown below. To print the map directly to the printer, select ***File/Print*** from the menu.

To insert the map into a word processing document, first select ***File/Copy to Clipboard*** from the menu. Then open your document (using for example Microsoft Word) and press ***Control-V*** on our keyboard or select ***Edit/Paste*** from the word processor menu. Within the word processor program you can add text boxes and labels to indicate points of interest for the PMI, MEI, etc.



10.6.13 Exporting Data

All of the data that is shown on the risk window can be exported to comma-delimited files that can be easily loaded into Excel. To export the data, select ***Export/Export All Details*** from the menu of the Risk window. You will be prompted for the name of a directory where all of the exported files will be written. This would typically be the project directory, or a subdirectory under the project directory. After all of the data is exported, you will see report window showing the names and locations of the various files, as shown below. The format of each of these files is described in section 10.7.11.



10.6.14 Health Table

The health table is stored in the Microsoft Access database file HEALTH.MDB, which is installed in your HARP directory. The health table contains all of the chemical-specific data that is used in the risk analysis. This includes cancer potency values, chronic and acute noncancer reference exposure levels. For each chemical there are also a number of flags that indicate which pathways apply to each of the chemicals for cancer effects and which organ systems apply to each chemical for acute and chronic effects. This table is in a read-only format. To view the contents of the health table, click on ***Health Table*** from the main risk window.

10.7 Stochastic Analysis

10.7.1 Prerequisites

Before you can compute risk for a residential receptor, you must have entered your facility emissions data into the HARP database (CEIDARS-Lite) and have run the air dispersion analysis. Open the risk window by selecting ***Analysis/Risk Analysis*** (choose either the *Representative* or *Screening Met Data* option) from the HARP main menu. Then open the source-receptor file that was created from your air dispersion analysis (*.src) by clicking on ***File/Open Source/Receptor File (Dispersion analysis results)*** from the risk window (see section 10.5.2). This loads the X/Q values from the dispersion analysis into memory and automatically calculates the GLCs.

To perform stochastic analysis, select ***Analysis/Stochastic (Includes multipathway)*** from the Risk window menu. The window that will appear is referred to as either the Stochastic/Multipathway or Network window, because it provides tools for viewing all details and intermediate calculations of the multipathway network. Because the stochastic analysis is closely tied to the network, these two general topics have been combined into a single window. See section 4.8 for a tutorial on stochastic analysis.

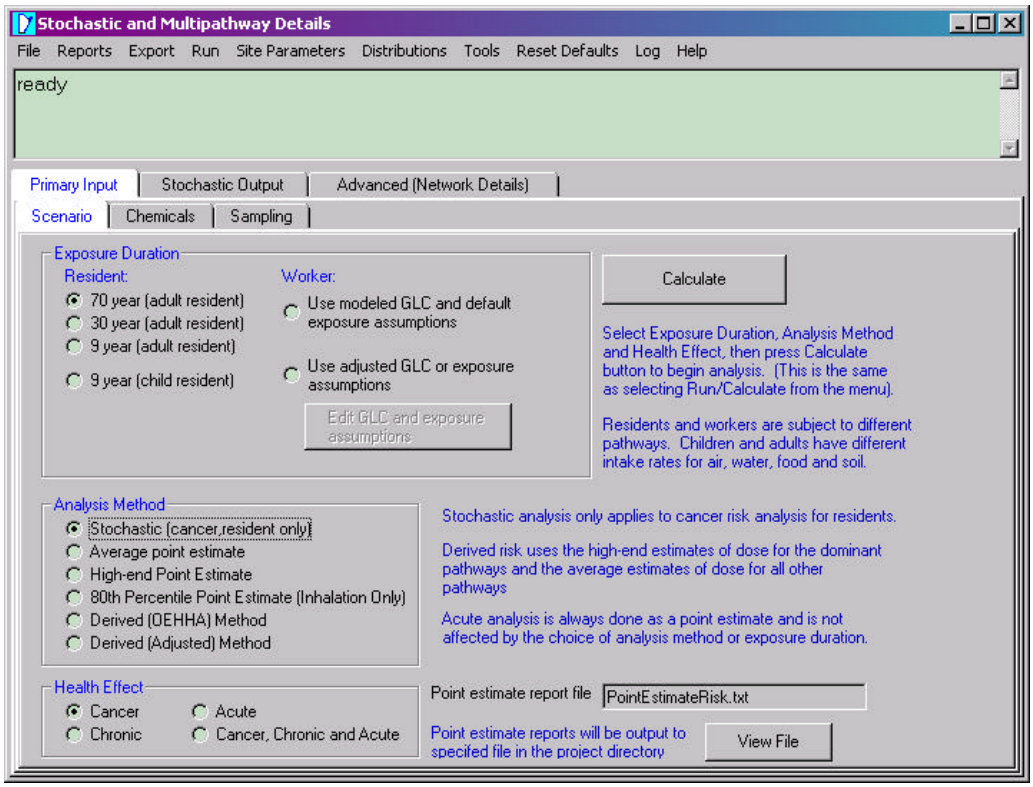
From the same window, it is also possible to perform point-estimate analysis for a single receptor and view every intermediate step in the analysis. At this point, it is assumed that the user is familiar with the setup of a point estimate analysis in HARP. If not, it may be best to perform the point-estimate analysis by following the follow the step-through guide under ***Point-Estimate (includes Multipathway)*** and see section 10.6 for more information.

10.7.1.2 Stochastic/Multipathway Window

The Stochastic/Multipathway window is opened by first opening the risk window and then selecting ***Analysis/Stochastic (Includes multipathway)*** from the menu.

The Stochastic/Multipathway window is organized under three tabs:

1. The *Primary Input* tab allows you to view and edit the primary input parameters used in the analysis. Some of these parameters apply only to stochastic analysis, and some of them apply to both stochastic and point-estimate analyses. For example, a stochastic analysis can only be applied to a residential receptor.
2. The *Stochastic Output* tab allows you to display and print several graphical and tabular reports generated from the stochastic analysis.
3. The *Advanced (Network Details)* tab allows you to view intermediate results at any point in the multipathway network. This tab exposes a lengthy and complex list showing every intermediate step in the calculations. It is considered to be for advanced users.



STOCHASTIC / MULITPATHWAY WINDOW

10.7.2 Primary Input

Before running a simulation, you should review and edit all of the parameters under the ***Primary Input*** tab of the Stochastic/Multipathway window. There are three sub-tabs which are described in the following sections: ***Scenario***, ***Chemical,*** and ***Sampling***.

10.7.2.1 Primary Input: Scenario

To edit the scenario parameters, first click the ***Primary Input*** tab on the Stochastic/Multipathway window. Then click the ***Scenario*** tab. The window will appear as shown above.

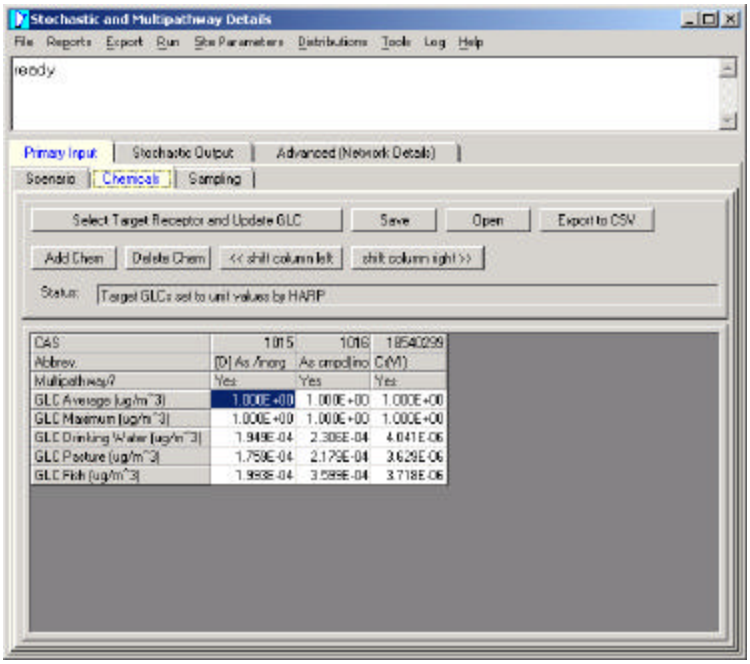
Select the exposure duration and receptor type for your analysis. Remember that a stochastic analysis can only be applied to a residential receptor.

Select the *Analysis Method*. If you select anything other than Stochastic, then only one sample trial will be executed and the result will be a point-estimate rather than a stochastic analysis. In that case the results will be read from the *Network Details* tab, and the results under the *Stochastic Output* tab will be meaningless. From this screen, analyses using point-estimates of exposure to estimate risk are normally only done by very experienced users for the purpose of examining intermediate values on the network.

Select the health effect of interest, either cancer or noncancer (acute or chronic); however, a stochastic analysis only applies to cancer. If you select noncancer, then the stochastic analysis button will be grayed out and inactive.

10.7.2.2 Primary Input: Chemicals

To edit the chemical GLC values, first click the ***Primary Input*** tab on the Stochastic window. Then click the ***Chemicals*** tab. The window will look similar to the following.



Then click the button labeled ***Select Target Receptor and Update GLC***. You will be prompted for the receptor number that you wish to run the analysis for (receptor numbers can be found on the risk window). Enter the receptor number and press OK. The table will then be updated with current GLC values. The GLC values will be extracted from the risk window, so in order for this to work you must have previously opened a source-receptor file from the risk window.

The table shown under the ***Chemicals*** tab lists the GLCs for each of the chemicals at four receptors. The first receptor is the target receptor, (i.e. the receptor that is being analyzed). For the target receptor, both the average and maximum GLCs are shown. The average GLC is used for the cancer and chronic analysis, and the maximum GLC is used for the acute analysis. (Reminder: stochastic analyses only apply to cancer analysis).

The other three receptors shown above are the pathway receptors. These are receptors located at the drinking water source, the pasture location, and the location of locally caught fish. The locations of these receptors must be specified when you set up and run the dispersion analysis. These receptors are necessary to determine the concentration of chemicals in the animal products, drinking water, and locally caught fish.

The third row of this table shows whether each chemical is a multipathway chemical or not. For chemicals that are not multipathway, the GLCs for the three pathway receptors are not used and are therefore grayed out.

You may edit the GLC in this table directly in the cells where they are displayed. To restore the original values after you have edited them, click the button labeled ***Select Target Receptor and Update GLC*** and reenter the receptor number.

You may also add a chemical to the list by clicking the button labeled ***Add Chem***. You will be prompted with a list of available chemicals. When you select a chemical from the list and press OK, the chemical will be added to the table of chemicals shown above.

To delete a chemical from the list, click on one of the cells in the column below that chemical, and then click the button labeled ***Delete Chem*.**

The ***Export to CSV*** button is used to export the table to a comma-delimited file (CSV file). This can then be imported into a spreadsheet or word processor for printing.

The right and left arrow buttons (>> and <<) are used to shift one of the chemicals to the right or left in the list. You must first click the column that you want to move, and then click the appropriate button. The reason you may want to do this is that the results of the multipathway analysis on the *Network Details* tab are shown for only the last chemical in the list. If you want to examine details for a particular chemical, move it to the last column.

10.7.2.2.1 Performing a Stochastic Risk Analysis for a Single Receptor Without A Dispersion Analysis

If you know the ground level concentrations at some location you can enter them directly on the Stochastic and Multipathway Details window and proceed with risk analysis without ever running the dispersion analysis. These are the steps:

Edit Chemical Ground Level Concentrations

On the *Stochastic and Multipathway Details* window, click the *Primary Input tab* and the *Chemicals tab*. Add or delete chemicals from the list, then edit the ground level concentrations for the appropriate locations. For more information see section 10.6.3.2.

Set Run Parameters

Input the site, scenario, and sampling parameters, identify the stochastic output results as described in the following sections.

Run Simulation

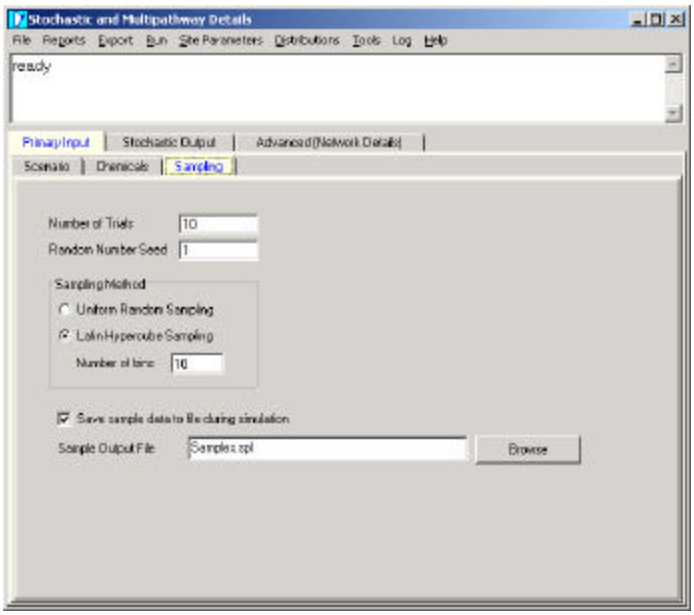
Select ***Run/Continue Stochastic*** from the menu. You may also interrupt the simulation by pressing the ***Cancel Operation*** button from the log window, then resume by selecting ***Run/Continue Stochastic***. The ***Continue Stochastic*** option will run multiple trials continuously until the limit specified under the Sampling tab is reached. In comparison, if you choose ***Run/Single Step Stochastic*** HARP will execute one more trial in the Monte Carlo simulation. Run the simulation as described in the following section. Note that if you only want a point-estimate report, not a stochastic analysis, you can select one of the point-estimate options under the *Analysis Method* section under the Scenario tab.

10.7.2.2.2 Specify Site Parameters

If you have not done this previously, you will need to set-up your site parameters. From the top of the stochastic window, select the ***Site Parameters*** menu and fill in the appropriate exposure pathway information behind the tabs. (See section 10.6.3).

10.7.2.3 Primary Input: Sampling

To edit the sampling parameters, first click the ***Primary Input*** tab and then the ***Sampling*** tab on the Stochastic window. The window will then appear as shown below.



In the first box enter the number of trials that you want to execute in the Monte Carlo simulation. It is useful to enter a small number of trials to begin with (e.g., 1000), and examine the results to see that they make sense and that you have not made any input errors. When you are convinced that you have set-up everything correctly, you can then set the number of trials to a larger number (typically 5,000 to 10,000) to obtain accurate results.

After you have examined the results, and you feel that more trials are necessary, set the number of trials to indicate how many additional trials you want to run, and then select the random seed number.

The *random seed number* is used to initiate the randomization of trials during the stochastic simulation. The computer uses this seed number in a series of computations to generate an array of numbers for stochastic calculations. By default the number is set to one. If you do not change the random seed number, then each time you run the simulation, you will get exactly the same results. In other words, the random numbers will be the same sequence each time you run a simulation. If you want to run two different realizations of the same simulation, then change the random seed number between runs. If all other inputs are the same, then you will obtain results that are different, but in theory are statistically equivalent. The random

number seed can be any single precision floating point number. Negative and positive numbers are treated as the same (i.e. a negative sign is ignored).

Finally, select either uniform sampling or Latin hypercube sampling. Latin Hypercube sampling generally produces more accurate estimates of the extreme statistics. If you select Latin Hypercube sampling, then you must specify the number of bins from which to select the samples.

As the number of bins increase, the accuracy of the extreme statistics improves, which is to say that the chances of observing an extreme event among the trials is higher. In principle, using Latin Hypercube sampling improves the definition of the shape of the output distribution curves by forcing some samples to be taken near the tail ends of the distribution.

For example, if you are really interested in, say, the 99th percentile of risk, then you want to make sure that you get several trials where the variate values fall above the 99th percentile. If you are only doing 100 samples, the chances of this are small, so your results won't be very meaningful. In this case you might want to set the number of bins to 100 and take 1000 samples. The Latin Hypercube method will then guarantee that 10 of those samples fall above the 99th percentile for each of the variates. So, as a general rule you might say that the number of bins should be about 10-fold smaller than the number of samples. But it should also reflect the extreme-ness of the statistics that you are interested in. If you want to accurately resolve the 99.9th percentile (i.e. 1/1000 extrema), then you probably would want 1000 bins and several thousand samples.

Select ***Run/Continue Stochastic*** from the menu. You may also interrupt the simulation by pressing the ***Cancel Operation*** button from the log window, then resume by selecting ***Run/Continue Stochastic***. The ***Continue Stochastic*** option will run multiple trials continuously until the limit specified under the Sampling tab is reached. In comparison, if you choose ***Run/Single Step Stochastic*** HARP will execute one more trial in the Monte Carlo simulation.

10.7.3 Primary Input: Saving and Retrieving Raw Sample Data

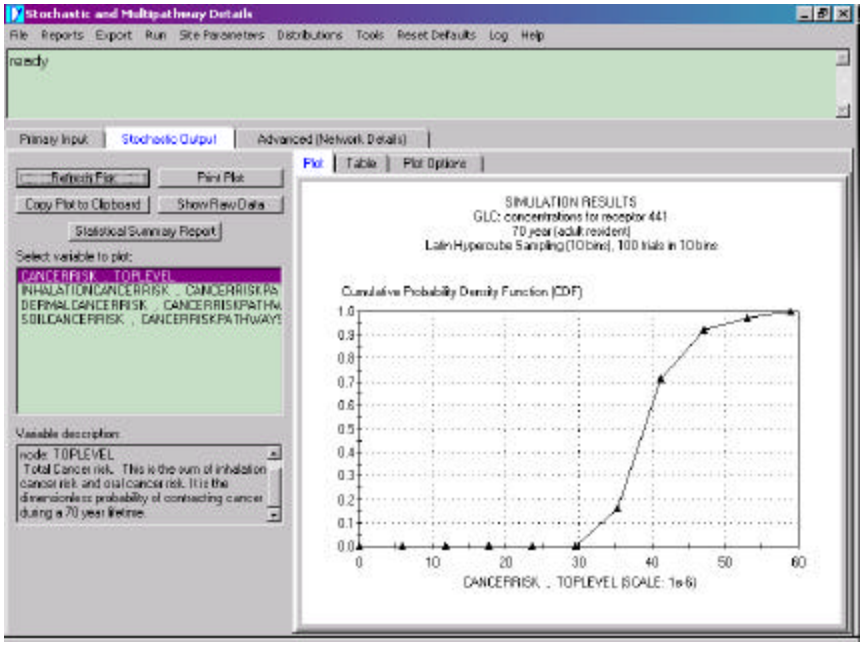
In the Sampling window shown above there is a check box labeled "*save sample data to file during simulation*". If this box is checked, each of the samples will be saved to a file as the simulation proceeds. Later you can read the raw sample data back into the program without rerunning the simulation. This allows you to view the data from a previous simulation.

To load sample data from a file, select ***File/Open Stochastic Sample File*** from the menu.

10.7.4 Output Processing

10.7.4.1 Plot

To plot a distribution of an output variable, select the ***Output Stochastic*** tab on the Stochastic window. Then select the ***Plot*** tab. The window will appear similar to the following.



STOCHASTIC OUTPUT WINDOW

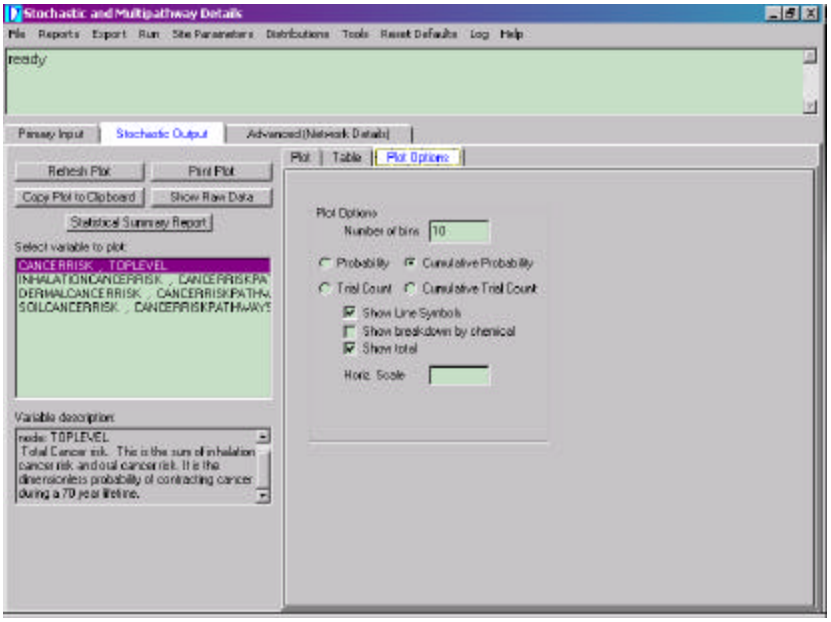
The left side of the window shows the variables that are available for plotting. The default variables that will be listed in this window are determined by the pathways that are selected in the *Site Parameters* window. "Top Level Cancer Risk" is always listed. This provides you with the total multipathway cancer risk. To change the list of variables available for plotting you must change the "save" option on the ***Network Details*** tab and rerun the simulation. Refer to section 10.7.6.1. To select a variable for plotting, highlight the name of the variable by clicking on it with the mouse. In the example above, the user has selected Cancer Risk as the variable to plot.

After selecting the variable, click the button labeled ***Refresh Plot***. The right side of the window will then show a distribution plot for the selected variable. Various options are available for plotting, as described in the following section.

To print a plot, click the button labeled ***Print Plot***. If you want to insert the plot into a word processing document, click the button labeled ***Copy Plot to Clipboard***, then open your document (for example using Microsoft Word) and press Control-V or select ***Edit/Paste*** from the menu.

10.7.4.2 Plot Options

To change the plot options, click the ***Plot Options*** tab. The window will appear similar to the following. Select the option you want from the right hand pane and press the button labeled ***Refresh Plot*** to redraw the plot with the new options.



STOCHASTIC PLOT OPTIONS WINDOW

The distribution curves are generated by first sorting the raw sample data from the Monte-Carlo trials, then collecting the data into bins according to the values of the variable. The bins are bounded by equally spaced intervals of the variable values. For example, if the maximum risk from all the samples is 10^{-6}, and you specify 100 bins, then the first bin will contain the samples having risk values between 0 and 10^{-8}. The second bin will contain samples having risk values between 10^{-8} and 2.0×10^{-8}, and so on. The ordinates of the distribution curve are simply the count (or cumulative count) of the number of samples in each bin, divided by the total number of samples. This represents an estimate of the probability (or cumulative probability) that the risk will fall in that interval. Plotting the count for each of the bins against the risk value for each bin produces an estimate of the probability (or cumulative probability) of risk (or whatever variable is being plotted).

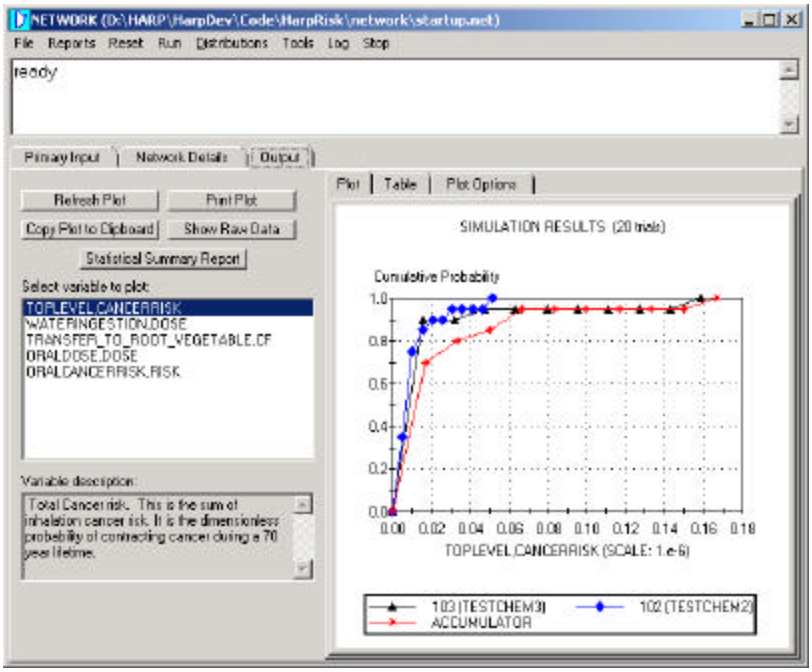
You can change the number of bins used in the analysis by entering a new value in the box labeled ***Number of bins***. Reducing the number of bins has the effect of smoothing the curve.

You have four choices of what to plot. The most useful plot is cumulative probability, because it allows you to read the probability of exceeding any risk level directly from the graph. You may also choose to plot probability, rather than cumulative probability. This may be useful for comparing with standard statistical distribution curves that are presented in this way.

The trial count and cumulative trial count options generate plots where the vertical axis is the dimensional number of trials rather than the non-dimensional probability. This is generally used only for quality assurance testing and diagnostic purposes, but may be of interest to some users.

The check box labeled ***Show Line Symbols*** turns the symbols on or off. The symbols are useful to distinguish the curves when you have several chemicals and you have checked the box labeled ***Show Breakdown By Chemical*** (see below).

If you check the box labeled ***Show Breakdown By Chemical***, then a separate curve will be shown for each chemical. In this case the plot will appear similar to the following.



STOCHASTIC OUTPUT */WINDOW

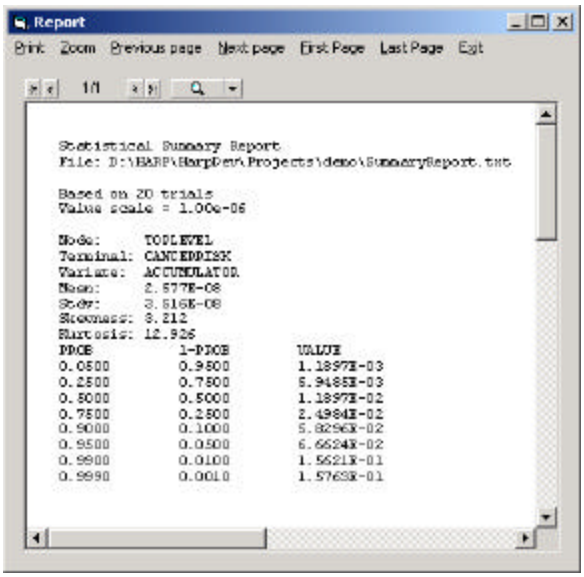
In this example the simulation was done for two chemicals. These are chemicals with CAS numbers 103 and 102 respectively. (These are fictitious chemicals included for testing purposes only.) The multipathway analysis calculates the contribution to cancer risk separately for each chemical and combines the results. In the process of doing this it collects sample data for each of the chemicals. By checking the box labeled ***Show Breakdown By Chemical***, the distribution curves for all chemicals are shown on the graph. The total risk is always shown as the curve labeled ACCUMULATOR, since it is the accumulated risk from the different chemicals. You may turn the ACCUMULATOR curve on or off by checking or unchecking the box labeled ***Show Total***.

The mathematical process of combining the results from multiple chemicals into a total risk value is a complicated matter. Because the risk contributions from each chemical are random and statistical in nature, and because the curves are generated by grouping samples into bins, the total risk as shown by the ACCUMULATOR curve cannot be directly derived from the curves of the individual chemicals. Instinctively, you would expect the risk values on the accumulator curve to be just the total of the risk values on the other curves. But this is seldom the case. This is further complicated by the issue of correlated vs. uncorrelated sampling, which is discussed in section 10.7.6.7.

Finally, you may set a scaling factor for the horizontal axis to improve the appearance of the plot. For cancer risk, where the values will typically be on the order of 10^{-6}, you would probably want to enter a value of 10^{-6} for the horizontal scale. To set the scale the horizontal axis to the actual values, set the value of horizontal scale to 1.0.

10.7.4.3 Statistical Summary Report

You can generate a statistical summary report by simply pressing the button labeled ***Statistical Summary Report***. The report will be generated for whatever variable you currently have selected in the variable list (i.e. the same variable that you have plotted). The report will appear similar to the following window.



This report is always written to an ASCII file, whose name appears on the second line of the report as shown above. This file can be easily imported into any word processor.

As shown above, the statistical summary report shows the risk levels at preset probability levels. In the example above, the estimate of risk at a 99% probability level is 1.5621E-01. This means that there is a 99 percent probability that the risk will be lower than this value, and a one percent probability that it will be higher. Note that the "Value Scale" is set to $1x10^{-6}$, which means that the risk values shown on the right hand column have units of $1x10^{-6}$. Therefore, the 99 percent probability cancer risk is actually **1.5621E-07 or 0.156** chances per million. The "Value Scale" is the same as the horizontal scale that you specify under the plot options (see section 10.7.4.2). For cancer risk, where the values will typically be on the order of $1x10^{-6}$, you would probably want to enter a value of $1x10^{-6}$ for the horizontal scale. To set the scale the horizontal axis to the actual values, set the value of horizontal scale to 1.0.

The risk values are determined by linear interpolation between the points on the distribution curve that you have plotted. There is no attempt made to extrapolate the tail of the curve beyond the highest value sampled. The last point on the cumulative probability distribution curve has, by definition, a cumulative probability of 1.0, because all sampled points

have values lower than the maximum seen during the simulation. To ensure that you have accurately captured the shape of the tail of the curve (i.e. the low probability, high risk values) you should run a large number of trials. To add confidence to the risk estimates, you may want to perform a sensitivity study for your particular problem by running additional trials to observe whether the low-probability risk estimates change.

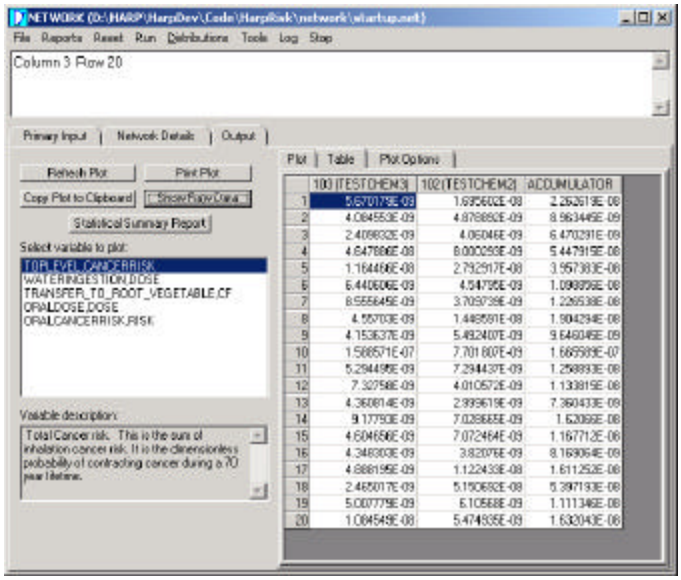
This report also lists the mean, standard deviation, skewness and kurtosis of the distribution curve.

10.7.4.4 Table

Whenever you generate a plot of a variable distribution, the numbers that are displayed on the plot are also echoed to a table. To see the table of plotted values, just click the ***Refresh Plot*** and then click the ***Table*** tab. To export the plot values select ***File/Export/Distribution Data*** from the menu on the Stochastic/Multipathway window. (See section 10.7.11 for more information on exporting results). The plot data are shown for only one variable at a time, namely the variable that you have plotted.

10.7.4.5 Raw Data

You may view the raw sample data collected during the simulation by clicking the button labeled ***Show Raw Data***. The ***Table*** tab window will appear similar to the following.



STOCHASTIC OUTPUT TABLE WINDOW

Each row of the table on the right hand pane represents one trial during the simulation. Each trial is listed (in gray) in the left column. The right-most column is the value of the selected variable (in this case Cancer Risk), and the other columns are the values of the same variable after each of the sub-trials corresponding to the individual chemicals. Because cancer risk is linear with respect to the contribution from the individual chemicals, the ACCUMULATOR column is just the sum of the other columns.

In the example above, only 20 trials were run. More typically, thousands of trials will be run, and the list will be quite long.

To export the raw sample data select ***Export/Raw Sample Data*** from the menu on the Stochastic window. (See section 10.7.11 for more information on exporting results). The raw sample data are shown for only one variable at a time, namely the variable that you have plotted

10.7.5 Running a Stochastic Simulation

Before running a simulation, you should have either selected a specific receptor location from a SRC file or have input the site specific GLC for the chemicals of interest. In addition, all site, scenario, and sampling parameters should have been identified (see section 10.7.2). To start a simulation, either select ***Run/Calculate Stochastic*** from the menu or press the ***Calculate*** button on the Primary Input/Scenario tab. You can observe the progress by noting the trial count that will appear in the top pane of the window.

To interrupt the simulation, press the ***Cancel Operation*** button on the log window. To resume the simulation after stopping, select ***Run/Continue Stochastic*** from the top menu. This will run multiple trials continuously until the limit specified under the *Sampling* tab is reached. Or select ***Run/Single Step Stochastic*** to execute one single trail in the Monte Carlo simulation.

You may plot results as the simulation is running without pressing the ***Cancel Operation*** button. Simply click the ***Stochastic Output*** tab, and then click the ***Refresh Plot*** button as the simulation is running. Refer to section 10.7.4.2 for a description of plot options. You may also create and display the statistical summary report without stopping the simulation by clicking the button labeled ***Statistical Summary Report***. Both the plotted distribution and the statistical summary report will be based on the number of trials that were completed when the user created/updated the plot or report

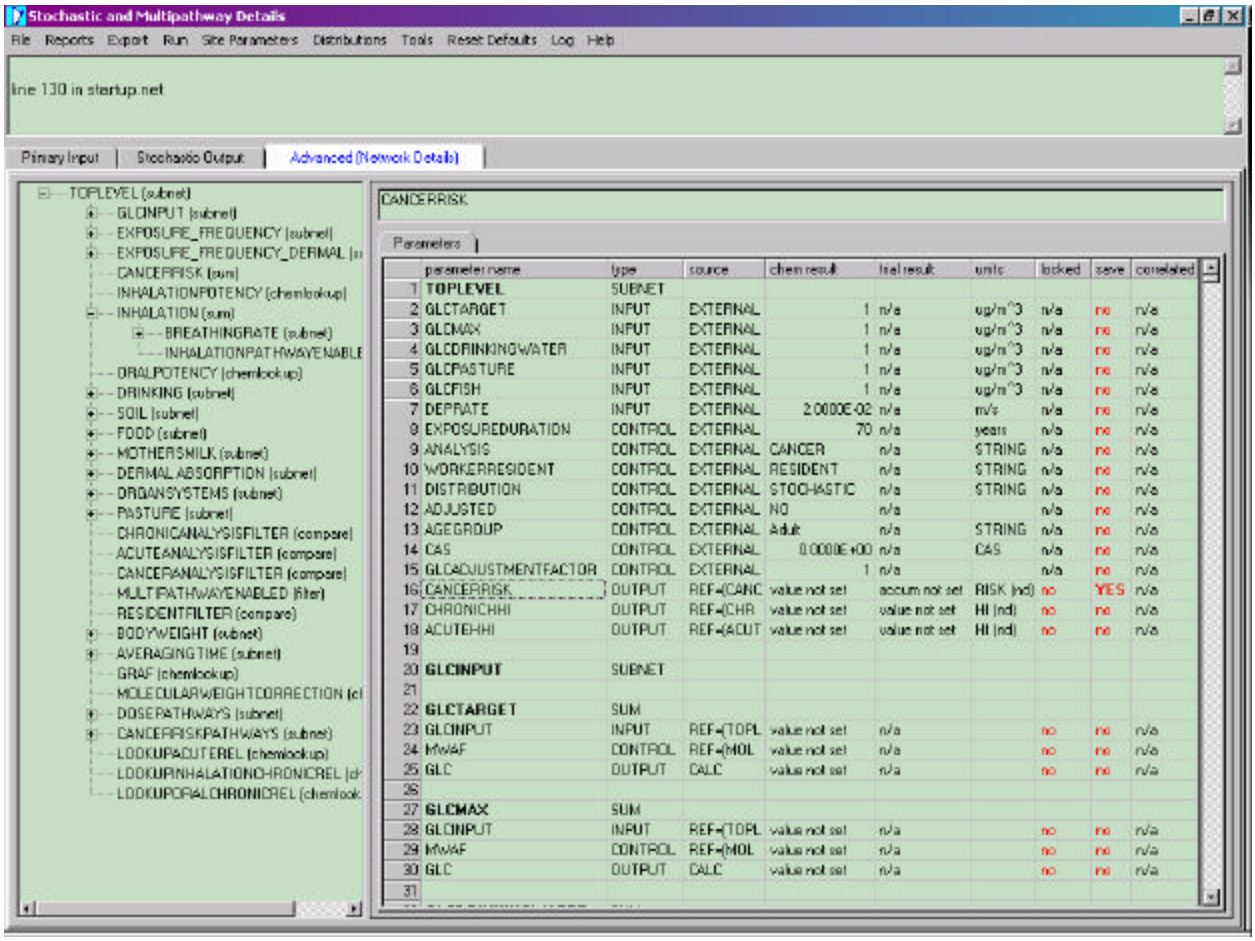
When the plotted distribution and the values in the statistical summary report have stopped changing significantly, that is an indication that you may not need to run any more trials. Refer also to section 10.7.4.3.

10.7.6 Network Details

10.7.6.1 Network Details: Selecting Which Variables to Capture During a Stochastic Analysis

When you run a Monte-Carlo simulation, statistics are not gathered for all variables, because this would use a lot of memory for gathering information that is not usually of interest. The variable that is of most interest is, of course, the cancer risk. You may, however, be interested from time to time in statistics of some other variables, for example inhalation cancer risk, oral cancer risk, or cancer risk from a particular pathway. For the purposes of understanding the calculations, you might even want to examine the sample statistics of some lower-level variables, such as breathing rate or food ingestion rates.

You may direct HARP to capture trial statistics for any of the variables in the multipathway network. To do this first click the ***Advanced* (*Network Details)*** tab. The window will appear similar to what is shown below.



NETWORK DETAILS

If the left pane shows only one line called TOPLEVEL, just click the + sign next to the word TOPLEVEL to expand the network tree.

The right pane shows a list of all the variables and equations (called nodes in this manual). The column on the right labeled "save" is used to indicate which of the variables will be saved in the list of trials during the simulation. The word "YES" next to a variable indicates that trial samples will be saved and that the trial data for that variable will be available after the simulation for plotting or reporting. The word "no" next to a variable indicates that trial data will not be saved.

To save trial data for a variable, click on the corresponding row under the "save" column and type Yes or No. The next time you run a simulation, the variables that you have elected to save will appear in a list under the output tab, where you can select which ones you want to plot or analyze.

In the example above, note that there is a "YES" in the row corresponding to CancerRisk. This indicates that the trial samples of cancer risk will be saved for post-processing.

The pane at the top of the window contains an explanation of whatever is currently highlighted. To highlight a variable, simply click on the row containing the variable. You can use the arrow keys to scroll down the list of variables one row at a time and read the descriptions on the top pane. In many cases you will find a reference to the equation in the OEHHA Guidelines where each variable is used.

10.7.6.2 Network Details: Nodes and Terminals

The multipathway network is represented by a collection of nodes and terminals. A node is the abstract representation of a decision point, an equation to be calculated, or some other operation. The terminals are the input and output points of the node. A node takes the input and transforms it to the output. Terminals are always assigned values, which may be either numeric or string.

This technique for modeling the network allows the entire set of equations, all of the numeric parameters and the entire logic of the network as they are described in the OEHHA Guidance Manual, to be described as input to the HARP program rather than be encoded in the program itself. The input files are contained in the NETWORK subdirectory under the HARP main program directory. This rather large set of input files is read by HARP automatically when they are needed for the analysis. The principal advantage of this organization is that the network and the input parameters can be modified without changing or recompiling the program. This has been important in facilitating the quality assurance and validation of the network algorithms by ARB and OEHHA staff. HARP users will only modify these files if they are performing a Tier-2 or Tier-4 assessment. Any changes made in the network are included in the exception report and must be reported in the risk assessment (see the OEHHA Guidance Manual).

The entire network can be viewed by selecting the ***Advanced (Network Details)*** tab on the *Stochastic* window. The left side of the window shows the network hierarchy in an outline format. Branches of the outline can be expanded by clicking on the plus (+) signs and contracted by clicking on the minus (-) signs. Each branch of the outline represents a node. When you

click on a node in the outline, the right side of the window shows the values of all of the terminals attached to that node.

The network that is modeled by HARP is very complex, consisting of hundreds of nodes and few thousand terminals. It is not expected that most users will have the need or desire to understand it completely. However, if you understand the OEHHA Guidance Manual document, you understand the network.

10.7.6.3 Autosize Grids

The ***Tools/Autosize*** menu option causes all the column widths under the *Network Details* tab to be adjusted to the width required to see all of the contents in all of the cells.

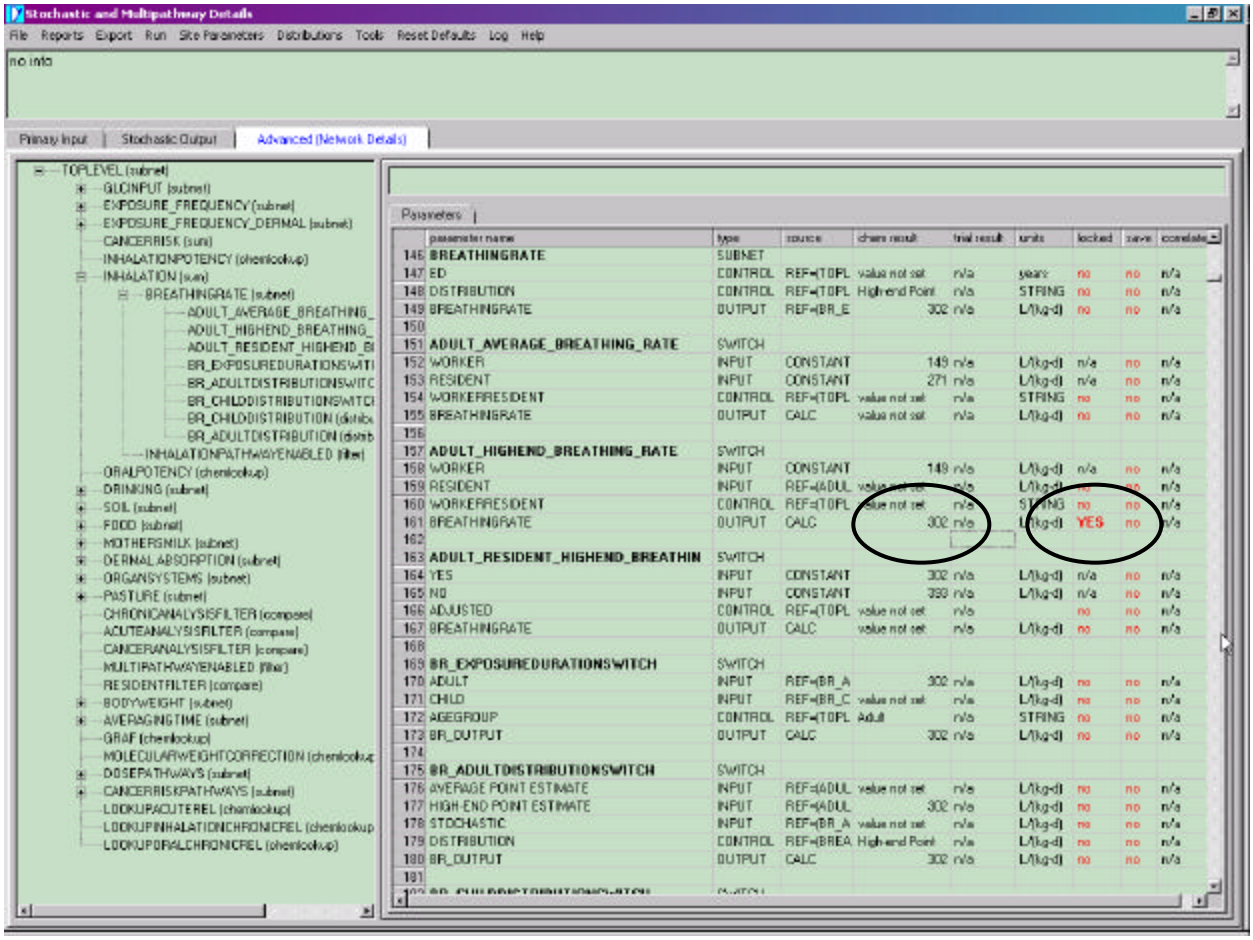
10.7.6.4 Network Details: Editing and Locking Variables for a Tier-2 or a Tier-4 Assessment

Through the ***Advanced (Network Details)*** tab, the value of any parameter, or variable, on the network can be edited by clicking on the cell to the right of that variable under the column labeled ***Chem Result*** and typing in a new value. "Value not set" means that the value will be calculated during the simulation if it is needed. Note that not all variables are computed during each simulation. Whether a particular variable is computed depends on what type of analysis you are doing. Variables that are not computed will still show a value of "Value not set" even after a simulation. For variables that are normally computed during the simulation, editing the value will have no effect unless the variable is also locked. To lock a variable, scroll to the right to the column labeled "***locked***" and change the value from no to YES.

If a variable is a constant, then it need not be locked, since constants do not change during a simulation. If a variable is a computed quantity, and you do not lock it, then its value will change during the simulation. In that case the program will overwrite any value that you enter.

The screen below illustrates how to modify the network for a single variable. In this example, the high-end point-estimate for the adult breathing rate (line 161) has been modified and the value in the column marked "locked" has been changed from no to YES. Changing the locked column assures that the value will remain locked during the simulation. Once all of the desired changes are made to the network, the user must recalculate the risk in the Risk Report window (see section 10.6.4). Note that after recalculating the risk, the breathing rate used in the calculation will show up on the network (line 149). The health impacts will be automatically updated in the Risk tab of the risk window (see section 10.6.6) or can be viewed by looking at the electronic or printed results.

Caution should be used if a user views the data in the network. Calculations in the network details are based on a ground level concentration of one microgram per cubic meter ($1\ \mu g/m^3$). When HARP calculates the health effects for a risk scenario, the actual ground level concentrations are multiplied by the data in the network details.



For example, a receptor with a ground level concentration of 2 µg/m^3 and a cancer risk of 6.0E-06 (in the Risk tab of the Risk Report window) would show a cancer risk of 3.0E-06 in the Advanced Network Details.

Also, HARP completes the calculations for each chemical separately. If you run a simulation that uses multiple chemicals, the numbers shown on the network represent the last chemical that was analyzed. You can change the order in which the chemicals are analyzed by selecting the Primary Input/Chemicals tabs and then clicking the "shift column" buttons. If you want to see details for a particular chemical, shift the column for that chemical all the way to the right so that it will be the last one analyzed. For the reasons presented here, it is best to view your results in the Risk tab of the Risk Report window, not in the network.

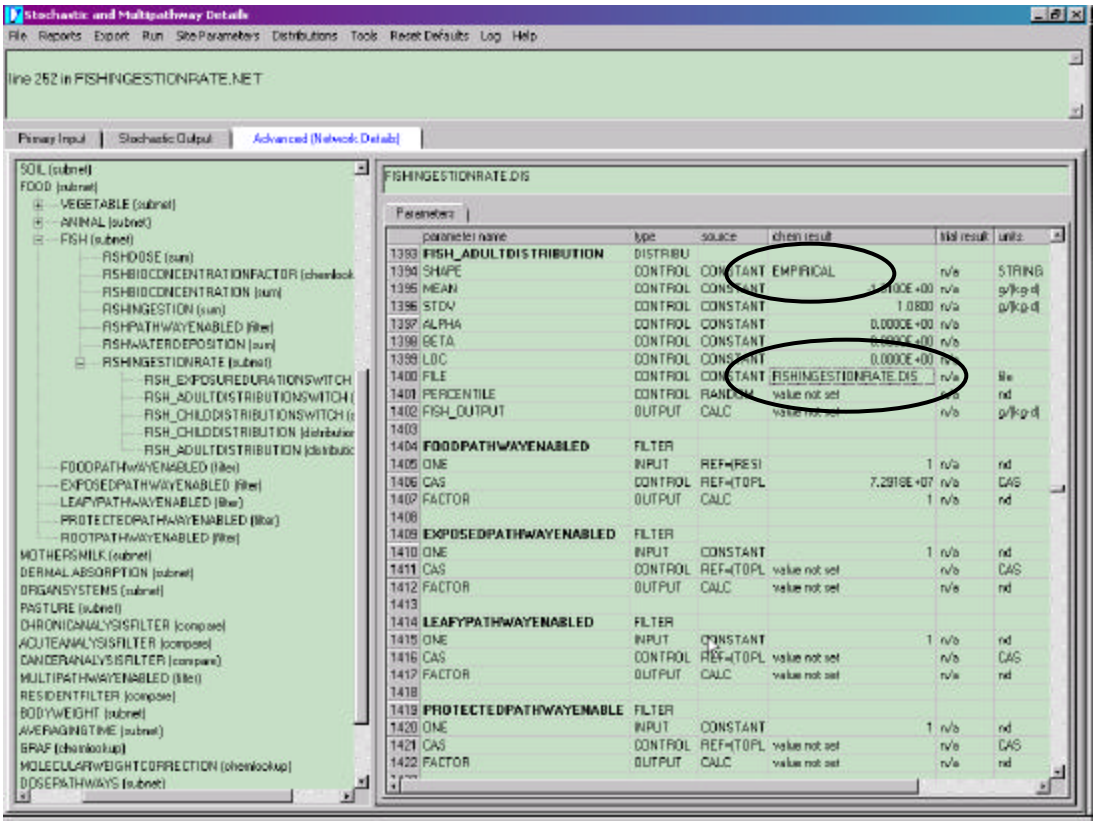
10.7.6.5 Network Details: Editing Distribution Shapes and Parameters for a Tier-4 Assessment

Through the ***Advanced (Network Details)*** tab, you can edit the parameters that describe a distribution type (called SHAPE, see line 1394) the same way you edit any single parameter. The parameters for a distribution define its shape (e.g. mean and standard deviation for a normal distribution). The distributions that may be used in HARP include (N)ORMAL,

(L)OGNORMAL, (W)EIBULL, (G)AMMA and (E)MPIRICAL. To edit the shape of a distribution, find the variable called SHAPE under a heading called DISTRIBUTION. Move across the row to the ***Chem Result*** column and type the first letter of the distribution name (N, L, W, G or E).

In addition to the pre-programmed distributions (Normal, LogNormal, Weibull, Gamma) you may provide you own (E)mpirical distribution in the form of an external data file that HARP uses as a lookup table. In order to use an externally defined distribution, see the example screen below and follow these steps:

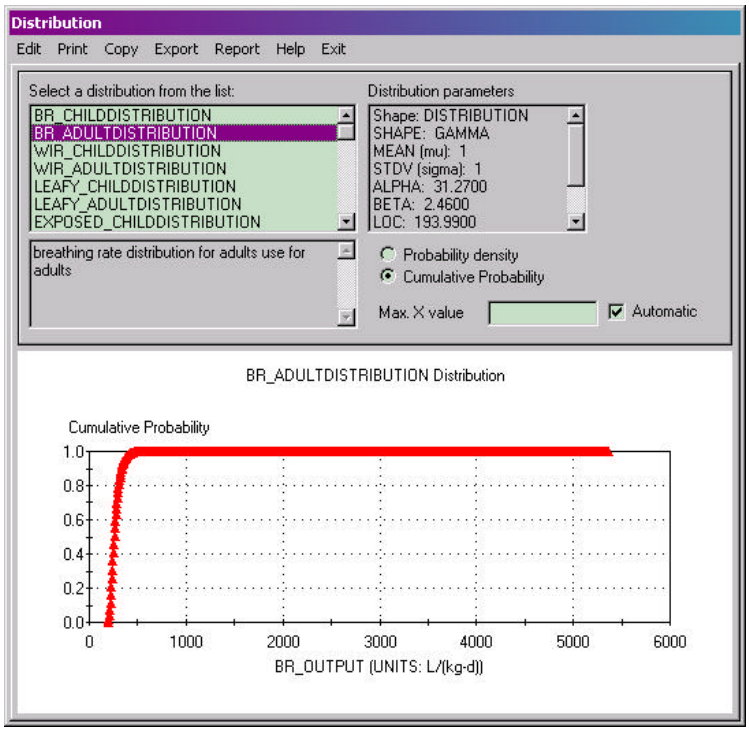
1. Locate the distribution of interest under the Advanced (Network Details) tab. In this example, we are looking at the fish ingestion distribution (line 1393).
2. Change the distribution type to Empirical by clicking on the value of the SHAPE parameter and typing the letter E (line 1394).
3. Click on the row labeled "File "(line 1400) and enter the name of the file that contains the empirical distribution data. <u>This file must be located in the *\network* directory below the main HARP directory, and it must have a .DIS file extension</u>
4. Note that no values for the distribution parameters are needed for an empirical distribution (e.g., standard deviation (stdv), mean, location (loc), alpha, or beta).
5. Create the distribution file using a text editor. The format of the file is described in section 10.8.1.



10.7.6.6 Network Details: Viewing the Input Distributions

There are about 37 variables defined in the OEHHA Guidance Manual as being stochastic in nature (as opposed to having point-estimate values). The distribution shapes and distribution parameters are pre-defined in the network according to the values recommended by OEHHA. The shapes and parameters can be edited by the user (see section 10.7.6.5) and can also be saved to a parameter file and later retrieved.

To view the currently defined distributions select ***Distributions*** from the menu on the Stochastic/Multipathway window. This will expose the distribution window, similar to what is shown below. This window is used only for examining the input distributions, not for editing them.



DISTRIBUTION WINDOW

The scrolling list on the left side of the window shows a list of all of the variables for which input distributions have been specified. When you click on any variable in this list, the distribution parameters are shown in the upper right pane and a plot of the distribution curve is shown in the lower pane. The plot may be shown as either a probability distribution function or cumulative probability distribution function by clicking the corresponding button on the middle-right-side of the window.

If you would like to change the scale of the x-axis for the distribution, uncheck the automatic box and enter a new maximum value for the x-axis in the *Max X value* slot. After entering the value, press the *"Refresh Plot"* button, and the plot of the distribution will be updated with the new maximum value in the x-axis.

10.7.6.7 Network Details: Correlated vs. Uncorrelated Sampling

By default, the sampling of random variables is correlated between one chemical and the next. This means that when a variate (for example breathing rate) takes on a high value for one chemical, it must take on a high value for all chemicals. Random variables always have a YES or NO in the correlated column.

Only a few of the parameters (37 at last count) have this option enabled. For the rest of the variables, the "correlated" column shows n/a and is locked. The variables for which this parameter applies are the random numbers associated with each of the random variates defined in the OEHHA Guidance Manual. To see a list of the random variables and their distributions refer to section 10.7.6.6.

You may elect to change the sampling procedure for one or more random variables by changing it from correlated to uncorrelated. This is done by first clicking the *Network Details* tab on the Stochastic/Multipathway window. Then scroll to the right most column of the Network Details pane and change the value under the "correlated" column from "YES" to "No".

When you stipulate that the sampling of a variable is uncorrelated, HARP will use a different random variable value for each of the chemicals within a single trial for that variable. For example, if breathing rate were processed using uncorrelated sampling, this would imply, that the breathing rate for different chemicals could be different during a single trial. If the sampling is uncorrelated, then the breathing rate for one chemical may be (and probably will be) different from for the other chemicals (i.e. the breathing rate is uncorrelated from one chemical to the next).

10.7.7 Network Tools

10.7.7.1 Network Tools: Print Network Outline to File

From the Stochastic window, select ***Tools/Network Documentation/Outline to File (txt format)***. This will generate an ASCII file containing a detailed outline of the entire multipathway network. This is for documentation purposes. The file that is produced can be viewed with a text editor or loaded into any work processor.

10.7.7.2 Network Tools: Print Network Description to File

From the Stochastic/Multipathway window, select ***Tools/Network Documentation/Network Description (txt format)***. This will generate an ASCII file containing a detailed list of all of the nodes in the multipathway network. Each node will include a verbal description and a list of all of the terminals connected to that node. This is for documentation purposes. The file that is produced can be viewed with a text editor or loaded into any work processor.

10.7.8 Exception Report

The exception report is a report that shows if the user has set any of the variables in the network to non-default settings. Because there are so many variables in the network, it may be difficult to remember which, if any, you have changed. The exception report will tell you which ones you have changed.

To generate an exception report, click on ***Report/Exception Report (txt file)*** from the Stochastic/Multipathway window. You should print and save the exception report as a general practice if you make any changes to the network parameters. This will provide evidence and documentation to future reviewers as to exactly what input you may have modified.

10.7.9 Log Window

The log window appears automatically in many circumstances to show progress during certain operations and to show any errors or warnings that may have occurred. To expose the log window at any time, select ***Log*** from the menu of the Stochastic/Multipathway window.

10.7.10 Exporting Data

10.7.10.1 Exporting Raw Sample Data

After running a simulation, you may export the raw sample data by selecting ***Export/Raw Sample Data (CSV format)*** from the menu on the Stochastic/Multipathway window. The raw sample data will be exported only for one variable at a time, namely the variable that you have selected to plot (see section 10.7.4.2).

The raw sample data will be exported in a comma-delimited (CSV) format, which can be easily imported into Excel for plotting, sorting, or further analysis. The format of this file is described in section 10.7.11.

10.7.10.2 Exporting Distribution Data

After running a simulation and generating a plot (see section 10.7.4.1), you may export the distribution data by selecting ***Export/Distribution Data*** from the menu on the Stochastic/Multipathway window. The values that were used to generate the plot will be exported only for one variable at a time, namely the variable that you have selected to plot (see section 10.7.4.2). The exported data will be the same as what is show under the *Table* tab immediately after generating a plot.

The number of data points exported depends on the number of bins selected to generate the plot (see section 10.7.4.2).

The distribution data will be exported in a comma-delimited (CSV) format, which can be easily imported into Excel for plotting, sorting, or further analysis.

The format of each of this file is described in section 10.7.11.

10.7.10.3 Network Details

When you select ***Export/Network Details*** from the menu of the Stochastic/Multipathway window, HARP will write the entire contents of the *Network Details* display tab to a file.

This feature is probably only useful to a limited number of sophisticated users for diagnostic purposes. The output is lengthy.

The Network Details tab displays the state of the network at the end of the last chemical for the last trial. Therefore, it is not very enlightening if you have just run a multi-chemical stochastic analysis. It is primarily useful for diagnosing the results for a point-estimate.

10.7.11 File Formats

This section describes the formats of the files exported from the point-estimate and stochastic risk analyses. These files can be imported into other programs for further analysis. All of these files are in ASCII comma-delimited format, which means they can easily be imported and viewed using Excel. To open one of these files with Excel, use the ***File/Open*** menu of Excel, or drag the file from the Windows Explorer into the Excel window.

10.7.11.1 File Formats: Point-estimate Risk Analysis Export

There are six X/Q files exported from the Risk window. They are:

XOQ_AVRG.CSV
XOQ_1HR.CSV
XOQ_4HR.CSV
XOQ_6HR.CSV
XOQ_7HR.CSV
XOQ_30DAY.CSV

Each of these files have the same format, which is shown below. The first row contains the name of the file. The second row contains the column headers. The SRC numbers in the column headers identify which emission source (stack) the data corresponds to. The third row contains the units. Each of the subsequent rows contains the data for each of the columns. The first column is the receptor number. The second column is the receptor type. The remaining columns, up to the last three, contain the X/Q values for each source receptor combination. The last three columns contain the UTM coordinates and the UTM zone.

The table shown below was created by simply opening the XOQ_AVRG.CSV file with Excel and printing the contents.

File: D:\HARP\HarpDev\PROJECTS\demo\export\XOQ_AVRG.csv									
Rec	Type	X/Q (SRC 1)	X/Q (SRC 2)	X/Q (SRC 3)	X/Q (SRC 4)	X/Q (SRC 5)	UTME	UTMN	ZONE
		(ug/m^3)/(g/s)	(ug/m^3)/(g/s)	(ug/m^3)/(g/s)	(ug/m^3)/(g/s)	(ug/m^3)/(g/s)			
1	PATHWAY	8.34E-01	1.04E+00	1.29E+00	1.41E+00	1.47E+00	474700	3633000	11
2	PATHWAY	7.51E-01	9.50E-01	1.12E+00	1.26E+00	1.41E+00	474750	3632950	11
3	PATHWAY	8.28E-01	1.43E+00	1.90E+00	1.29E+00	2.31E+00	474800	3633050	11
4	GRID	7.60E-01	2.98E-01	2.84E-01	1.63E+00	1.65E+00	473800	3634500	11
5	GRID	8.94E-01	3.10E-01	2.96E-01	1.69E+00	2.03E+00	473900	3634500	11
6	GRID	1.09E+00	3.35E-01	3.20E-01	1.90E+00	2.90E+00	474000	3634500	11
7	GRID	1.39E+00	3.33E-01	3.06E-01	2.93E+00	2.65E+00	474100	3634500	11
8	GRID	1.94E+00	3.00E-01	2.78E-01	3.16E+00	1.35E+00	474200	3634500	11
9	GRID	2.94E+00	3.27E-01	3.10E-01	1.58E+00	1.07E+00	474300	3634500	11
10	GRID	4.14E+00	3.68E-01	3.46E-01	1.18E+00	1.43E+00	474400	3634500	11
11	GRID	0.00E+00	3.97E-01	3.71E-01	1.42E+00	1.00E+00	474500	3634500	11
12	GRID	0.00E+00	4.72E-01	4.34E-01	1.16E+00	1.06E+00	474600	3634500	11
13	GRID	2.80E+00	6.03E-01	5.53E-01	9.77E-01	6.08E-01	474700	3634500	11
14	GRID	1.81E+00	6.25E-01	5.97E-01	6.56E-01	8.37E-01	474800	3634500	11
15	GRID	1.25E+00	6.26E-01	5.67E-01	9.63E-01	9.31E-01	474900	3634500	11
16	GRID	9.49E-01	6.70E-01	6.47E-01	9.99E-01	8.29E-01	475000	3634500	11

There are six GLC files exported from the Risk window. They are:

GLC_AVRG.CSV
GLC _1HR.CSV
GLC _4HR.CSV
GLC _6HR.CSV
GLC _7HR.CSV
GLC _30DAY.CSV

Each of these files has the same format, which is shown below. The first row contains the name of the file. The second row contains the column headers. The CAS numbers in the column headers identify which chemical the data corresponds to. The third row contains the units. Each of the subsequent rows contains the data for each of the columns. The first column is the receptor number. The second column is the receptor type. The remaining columns, up to the last three, contain the GLC values for each chemical at each receptor. The last three columns contain the UTM coordinates and the UTM zone.

File: D:\HARP\HarpDev\PROJECTS\demo\export\GLC_AVRG.csv							
Rec	Type	CAS 1015	CAS 1016	CAS 18540299	UTME	UTMN	ZONE
		ug/m^3	ug/m^3	ug/m^3			
1	PATHWAY	1.95E-04	2.30E-04	4.04E-06	474700	3633000	11
2	PATHWAY	1.76E-04	2.18E-04	3.63E-06	474750	3632950	11
3	PATHWAY	1.99E-04	3.60E-04	3.72E-06	474800	3633050	11
4	GRID	1.68E-04	2.41E-04	4.68E-06	473800	3634500	11
5	GRID	1.97E-04	2.97E-04	4.86E-06	473900	3634500	11
6	GRID	2.40E-04	4.22E-04	5.47E-06	474000	3634500	11
7	GRID	3.05E-04	3.86E-04	8.42E-06	474100	3634500	11
8	GRID	4.22E-04	1.99E-04	9.10E-06	474200	3634500	11
9	GRID	6.39E-04	1.59E-04	4.56E-06	474300	3634500	11
10	GRID	8.99E-04	2.10E-04	3.40E-06	474400	3634500	11
11	GRID	5.72E-06	1.49E-04	4.08E-06	474500	3634500	11
12	GRID	6.79E-06	1.59E-04	3.32E-06	474600	3634500	11
13	GRID	6.13E-04	9.54E-05	2.81E-06	474700	3634500	11
14	GRID	3.99E-04	1.29E-04	1.89E-06	474800	3634500	11
15	GRID	2.78E-04	1.42E-04	2.77E-06	474900	3634500	11
16	GRID	2.14E-04	1.29E-04	2.87E-06	475000	3634500	11

The list of sources is exported to the file SOURCES.CSV. It has the format shown below. As usual, the first line is the name of the file. The second and third lines are labels and units, respectively. Each row corresponds to a release point (stack). The columns labeled FAC, CO, AB, DIS and STACK form a unique key that is used by HARP to reference back to the emissions database for each stack.

File: C:\HARP\PROJECTS\DEMO\SOURCES.csv											
Src. No.	ISC Tag	Name	FAC	CO	AB	DIS	STACK	UTME	UTMN	ELEV	ZONE
								meters	meters	feet	
1	PROSPECT PRODUCTS STACK 1	S001	1001	37	SD	SD	1	474470.45	3634603.3	75	11
2	PDQ REPAIR GUYS STACK 1	S002	2001	37	SD	SD	1	474120.45	3634197.3	1.5	11
3	DOUGS WHATNOT SHOP STACK 1	S003	3000	37	SD	SD	1	474005.45	3634167.3	10	11
4	ABC CHEMICAL STACK 1	S004	3002	37	SD	SD	1	474920.45	3633522.3	264	11
5	ABC CHEMICAL STACK 2	S005	3002	37	SD	SD	2	474950.45	3633457.3	264	11

The file RECEPTORS.CSV contains a list of all the receptors exported by HARP. The format is as shown below. The first column is the receptor number and the second column is the receptor type. POPRES and POPWORK are the residential and working populations respectively. If the receptor is a census block receptor, the POPRES comes from the census database. POPWORK only applies to sensitive receptors.

INDEX	TYPE	POPRES	POPWORK	UTME	UTMN	ZONE
1	PATHWAY	0	0	474700	3633000	11
2	PATHWAY	0	0	474750	3632950	11
3	PATHWAY	0	0	474800	3633050	11
4	GRID	0	0	473800	3634500	11
5	GRID	0	0	473900	3634500	11
6	GRID	0	0	474000	3634500	11
7	GRID	0	0	474100	3634500	11
8	GRID	0	0	474200	3634500	11
9	GRID	0	0	474300	3634500	11
10	GRID	0	0	474400	3634500	11
11	GRID	0	0	474500	3634500	11
12	GRID	0	0	474600	3634500	11
13	GRID	0	0	474700	3634500	11
14	GRID	0	0	474800	3634500	11

The file RISK.CSV contains the risk values computed for all receptors. Cancer, Chronic and Acute Simple are the risk values normally computed from the Risk Reports window. The column labeled Acute Max Hourly is the refined acute risk, which is often not computed, since it is time consuming. A value of –1.0 in any column indicates that the value has not been computed.

File: D:\HARP\HarpDev\PROJECTS\demo\export\RISK.csv								
Receptor	Type	Cancer	Chronic	Acute Simple	Acute Max Hourly	UTME	UTMN	ZONE
		Risk	HI	HI	HI			
4	GRID	6.74E-06	2.47E-02	3.04E+00	-1.00E+00	473800	3634500	11
5	GRID	7.46E-06	2.86E-02	3.12E+00	-1.00E+00	473900	3634500	11
6	GRID	8.94E-06	3.63E-02	3.10E+00	-1.00E+00	474000	3634500	11
7	GRID	9.57E-06	3.76E-02	2.93E+00	-1.00E+00	474100	3634500	11
8	GRID	9.08E-06	3.43E-02	4.10E+00	-1.00E+00	474200	3634500	11
9	GRID	9.93E-06	4.24E-02	4.94E+00	-1.00E+00	474300	3634500	11
10	GRID	1.23E-05	5.66E-02	5.33E+00	-1.00E+00	474400	3634500	11
11	GRID	4.57E-06	1.31E-02	3.94E-02	-1.00E+00	474500	3634500	11
12	GRID	4.55E-06	1.36E-02	5.17E-02	-1.00E+00	474600	3634500	11
13	GRID	8.95E-06	3.83E-02	3.79E+00	-1.00E+00	474700	3634500	11
14	GRID	7.35E-06	3.02E-02	2.57E+00	-1.00E+00	474800	3634500	11
15	GRID	6.58E-06	2.52E-02	2.17E+00	-1.00E+00	474900	3634500	11
16	GRID	5.95E-06	2.17E-02	1.78E+00	-1.00E+00	475000	3634500	11

The emission rates that appear under the emissions tab of the risk window are exported to two files, EMS_AVRG and EMS_MAX, which contain the average and maximum emission rates respectively. The format of each of these files is shown below. It is simply an exact copy of what is seen on the risk window, in a comma-delimited format.

File: D:\HARP\HarpDev\PROJECTS\demo\export\EMS_AVRG.csv								
	fac	dev	pro	stk	Mult			
CAS						1015	1016	18540299
Abbrev.						[D] As /inorg	As cmpd(inorg)	Cr(VI)
Background (ug/m^3)						0	0	0
Multiplier						1	1	1
SRC 1 EM	1001	1	1	1	1	15	*	*
SRC 2 EM	1002	1	1	1	1	1	*	*
SRC 3 EM	1002	1	2	2	1	*	1	*
SRC 4 EM	2001	1	1	1	1	*	*	0.2
SRC 5 EM	3000	1	1	1	1	*	10	*

10.7.11.2 File Formats: Stochastic Risk Analysis Export

From the Stochastic/Multipathway window, if you select Export/Raw Sample Data from the menu, HARP will export the raw sample data from the Monte Carlo simulation to the file RawSampleData.csv, in the format shown below.

The first row is the name of the file, and the second row is just a label. The third and fourth rows contain the node and terminal of the variable whose data is listed. In this example, the cancer risk variable has been exported. Each column contains the risk data for one of the chemicals alone. The last column is the total cumulative risk data for all chemicals. The sequential numbers in the first column are the trial numbers. If this data were sorted by the ACCUMULATOR column, then collected into discrete bins, and the results plotted, we would have the distribution curve that appears on the HARP plot window.

File: D:\HARP\HarpDev\PROJECTS\demo\export\RawSampleData.csv				
Raw Sample Data				
TOPLEVEL				
CANCERRISK				
	1015 ([D] As /inorg)	1016 (As cmpd(inor	18540299 (Cr(VI))	ACCUMULATOR
1	4.98E-03	4.99E-03	0.1108809	0.120852
2	1.10E-02	1.10E-02	0.128206	0.1502579
3	6.29E-03	6.29E-03	0.1604588	0.1730468
4	6.44E-03	6.44E-03	0.1342763	0.1471512
5	2.33E-02	2.33E-02	0.1460266	0.1926576
6	6.72E-03	6.72E-03	0.102552	0.1159912
7	6.40E-03	6.40E-03	0.1471196	0.1599123
8	5.23E-03	5.23E-03	0.114715	0.1251819
9	4.22E-03	4.22E-03	0.1212692	0.1297136
10	7.06E-03	7.06E-03	0.1703304	0.1844475
11	1.56E-02	1.56E-02	0.1278404	0.159084
12	6.95E-03	6.96E-03	0.1363375	0.1502468
13	4.91E-03	4.91E-03	0.1144479	0.1242586
14	5.41E-03	5.41E-03	0.103138	0.1139598
15	8.41E-03	8.41E-03	0.1504905	0.1673077
16	7.35E-03	7.36E-03	0.1521957	0.1669055
17	4.80E-03	4.80E-03	0.1126247	0.1222298
18	5.55E-03	5.55E-03	0.1831509	0.1942482
19	1.02E-02	1.03E-02	0.1304031	0.1509027

The file Distribution.csv contains the points that are plotted on the distribution curve that HARP displays under the *Stochastic Output* tab. The format is shown below. The number of points, and their magnitudes, are affected by the plot parameters. You can use this file to create your own annotated plots using Excel, where the plot data matches what is shown on the HARP plot window. In this file the second column is the value of the variate being plotted, and the third column shows the cumulative probability. It is cumulative in this case, because that is was selected under the plot options before the data was exported.

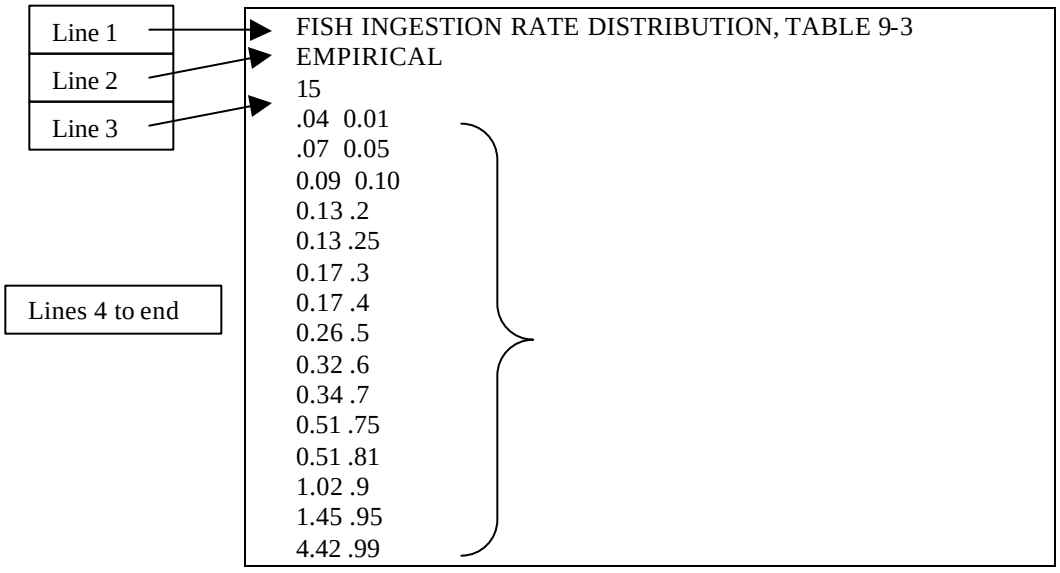
File: D:\HARP\HarpDev\PROJECTS\demo\export\Distribution.csv				
Sampled Distribution Data				
TOPLEVEL				
CANCERRISK				
	ACCUMULATOR			
	0	0		
	2.46E-02	0		
	0.049199566	0		
	7.38E-02	0		
	9.84E-02	0		
	0.122998916	0.14		
	0.147598699	0.48		
	0.172198482	0.83		
	0.196798265	0.94		
	0.221398048	0.98		
	0.245997831	1		

10.8 Empirical Distribution File

Section 10.7.7.5 describes how to modify the distribution parameters for one of the stochastic variables. One option is to specify the distribution parameters as an empirical lookup table. This section describes the format of the file, which you can create with a text editor or any other means at your disposal.

The box below shows a sample distribution file. All distribution files follow this exact same format. The file is ASCII, and the name of the file should have a .DIS extension.

1. First line is a descriptive header that can be anything you choose.
2. Second line must contain the word EMPIRICAL, exactly as shown.
3. Third line is an integer number that tells how many pairs of values follow. In this example, there are 15 pairs of numbers that describe the empirical distribution curve.
4. The remaining lines are (x, y) point pairs that describe the distribution. The x values are the dimensional value of the parameter, for example fish ingestion rate. The dimensions depend on which parameter this represents (consult the OEHHA Guidance Manual for details on each parameter). The y values are the cumulative probability that the actual value in any sample will be less than or equal to the corresponding x-value. In the example shown here, for instance, there is a 90 percent probability that the fish ingestion rate will be less than or equal to 1.02. If you prefer, you can insert all the data for distribution, rather than just inserting the selected points along the distribution.



Chapter 11 Table of Contents

11. Census and Elevation Data Sources

11.1 HARP Map

The mapping features of HARP are integrated into the risk analysis. Maps are displayed automatically on the right side of the *Risk* window when setting up and running point estimate risk analysis. This section gives a brief summary of the mapping functions.

11.2 Street Map (Tiger) Data

A complete set of street maps for the state of California is delivered with HARP. To open a street map file from the *Risk* window, select ***Files/Open Map File*** from the menu.

The street map files that are delivered with HARP are derived from Tiger data, which is available from the Census Bureau. It can be purchased for the entire west coast of the United States on CD, or you can download data for a single county at a time for free from the Census Bureau web site at:

http://www.census.gov/ftp/pub/geo/www/tiger/

The data that is included with HARP is from the 1995 tiger files. Since this data was acquired, more recent data has become available, though it is not known whether the more recent (1999) is more accurate with respect to the street locations. If you are satisfied with 1995 data, then you can use the data that is delivered with HARP and ignore the rest of this section.

Tiger data is quite bulky. San Diego County alone is 94 megabytes. This is compressed on the Census Bureau web site, so the zipped download file is only about 12 megabytes. Obviously you will need a high-speed connection to complete the download in a reasonable length of time. (A one million bps DSL line does this in about 2 minutes.)

When you download a Tiger file for a particular county and unzip it, you end up with 17 separate files. Much of the information in these files relates to demographics and geographical features other than streets, which is not needed for the purposes of running HARP. HARP provides a function for extracting just the information that it needs from the raw Tiger files and reformatting it into a compact, fast binary file. The binary file has an extension of .MAP. It can be loaded and displayed with HARP relatively quickly compared to the ASCII Tiger format. The binary file for San Diego County occupies about 7 megabytes. (This is based on the 1995 data. The 1999 data produces a binary file of about 9 megabytes, so apparently some streets have been added.)

After you have downloaded an unzipped the Tiger file, the conversion to a binary map file is quite simple. From the *Risk* window, select ***Files/Conversions/Convert Tiger to Binary***. You will be prompted for the name of the Tiger file. It will have an extension of .F61 if it is 1995 data, and .RT1 if it is 1999 data. Note that there are several Tiger files (17 as indicated above), but the one you want to open will have one of these extensions.

You will be prompted for the name of the output file. It should have a .MAP extension for consistency with what HARP expects. The name of the file should reflect the county that it represents to make it easier to identify in the future.

The conversion will take several minutes. After the conversion is done you will have a .MAP file that can be opened directly by HARP.

To aid you in locating the correct Tiger data file for downloading, the following is a list of the FIPS Codes (Federal Information Processing Systems) and CENID code (Census ID codes) for all of the counties in California. The name of the file that you should download is constructed by concatenating the letters TGR with the five-digit FIPS code. For example, the FIPS code for San Diego as shown below is 06073, so the name of the file that you want to download for San Diego is TGR06073.ZIP.

List of FIPS codes for counties in California:

06 001 1370 Alameda CA
06 003 1372 Alpine CA
06 005 1374 Amador CA
06 007 1376 Butte CA
06 009 1378 Calaveras CA
06 011 1380 Colusa CA
06 013 1382 Contra Costa CA
06 015 1384 Del Norte CA
06 017 1386 El Dorado CA
06 019 1388 Fresno CA
06 021 1390 Glenn CA
06 023 1392 Humboldt CA
06 025 1394 Imperial CA
06 027 1396 Inyo CA
06 029 1398 Kern CA
06 031 1400 Kings CA
06 033 1402 Lake CA
06 035 1404 Lassen CA
06 037 1406 Los Angeles CA
06 039 1408 Madera CA
06 041 1410 Marin CA
06 043 1412 Mariposa CA
06 045 1414 Mendocino CA
06 047 1416 Merced CA
06 049 1418 Modoc CA
06 051 1420 Mono CA
06 053 1422 Monterey CA
06 055 1424 Napa CA
06 057 1426 Nevada CA
06 059 1428 Orange CA
06 061 1430 Placer CA
06 063 1432 Plumas CA
06 065 1434 Riverside CA
06 067 1436 Sacramento CA
06 069 1438 San Benito CA

06 071 1440 San Bernardino CA
06 073 1442 San Diego CA
06 075 1444 San Francisco CA
06 077 1446 San Joaquin CA
06 079 1448 San Luis Obispo CA
06 081 1450 San Mateo CA
06 083 1452 Santa Barbara CA
06 085 1454 Santa Clara CA
06 087 1456 Santa Cruz CA
06 089 1458 Shasta CA
06 091 1460 Sierra CA
06 093 1462 Siskiyou CA
06 095 1464 Solano CA
06 097 1466 Sonoma CA
06 099 1468 Stanislaus CA
06 101 1470 Sutter CA
06 103 1472 Tehama CA
06 105 1474 Trinity CA
06 107 1476 Tulare CA
06 109 1478 Tuolumne CA
06 111 1480 Ventura CA
06 113 1482 Yolo CA
06 115 1484 Yuba CA

HARP can read any Tiger map file. For speed and storage efficiency, the Tiger files must first be converted to a HARP binary map file format. If you have acquired a Tiger file from some other source, you can convert it to binary by going to the risk window and select ***Files/Conversions/Convert Tiger to Binary*** from the menu. You will be prompted for the name of the Tiger file. HARP will then create a .map file. There is a limitation in that the conversion utility that is built into HARP only creates map files in UTM NAD83.

11.3 Elevation (DEM) Data (File extension *.dem)

11.3.1 Introduction to Digital Elevation Model (DEM) Data

Digital elevation model (DEM) files contain elevation data that can be used by HARP to automatically calculate elevations for stacks and receptors. Elevation data can be obtained in the format of DEM (Digital Elevation Model) files from the United States Geological Survey (USGS). This data can be utilized by HARP to simplify the determination of elevations of sources and receptors so that you do not have to enter elevations manually.

HARP has the ability to use DEM files in both the dispersion analysis and the risk analysis modules. You should be sure that the DEM data that you acquire covers the area of interest. If HARP attempts to look up the elevation for a source or receptor that is outside of the range of the DEM data, HARP will fill in a value of zero.

It is quite possible that a single DEM file does not cover the area that you are analyzing. You can open more than one DEM file concurrently by repeatedly selecting ***Files/DEM/Open DEM file*** from the menu. This allows you to cover a wider geographic area than would be provided by only a single DEM file. To see what files are currently open, select ***Files/DEM/List Open DEM Files*** from the menu.

If you have loaded multiple DEM files into memory concurrently, HARP will remember the names of all of the files the next time you run HARP. Instead of loading each file individually, you can select ***Files/DEM/Load Most Recent DEM Files*** from the menu. HARP will then load all of the files in sequence.

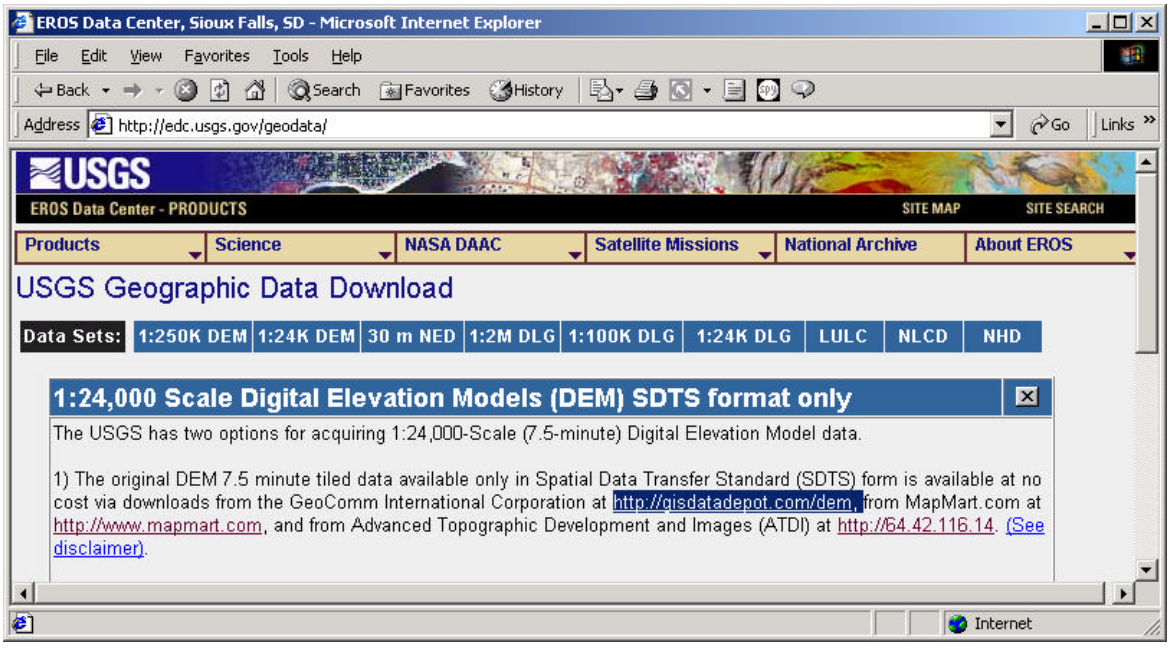
11.3.2 Download the Data from the USGS Website and Converting It

This section explains how to acquire DEM data from the United States Geological Survey (USGS) and convert it to the correct format for use by HARP. DEM data is available over the Internet from the USGS. Unfortunately, the USGS files are in SDTS format and there are several steps required to download the data and convert it into a form that can be used by HARP. To make this process a bit easier, when you install HARP, all of the tools that you need to accomplish this awkward task are included with the installation, with one exception (you will need a copy of WinZip as described below).

In the example below, it is assumed that you want to download elevation data for the La Jolla area of San Diego County.

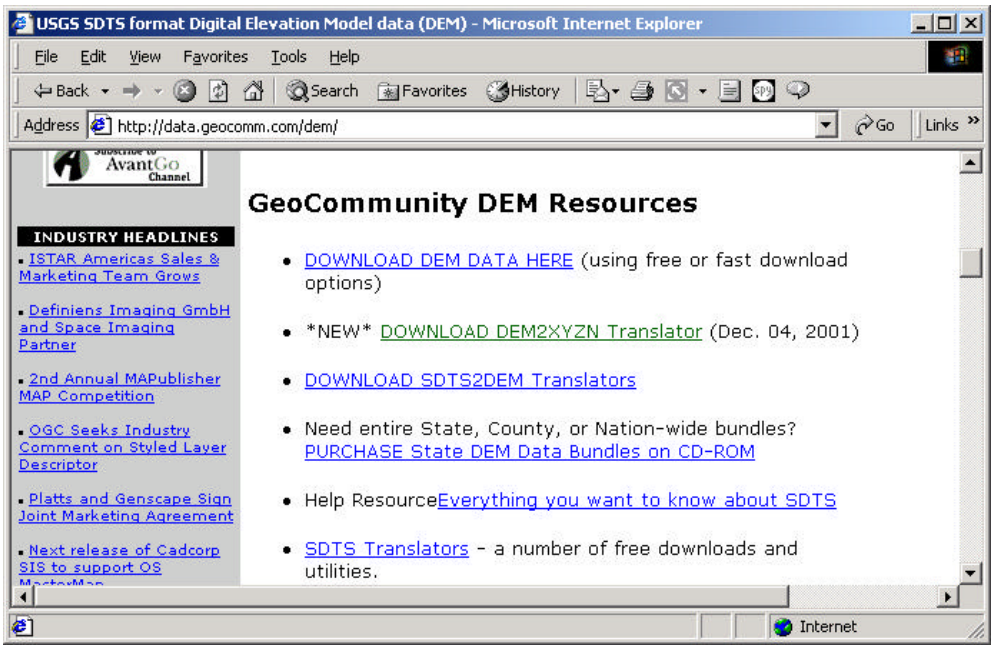
Use your Internet browser to access the USGS website at URL: http://edc.usgs.gov/geodata/

- Click on the Data Set option labeled "1:24K DEM"
- The top of the web page will direct you to at least three alternative sites where you can download DEM data. In this example, we assume that you have selected the link to http://gisdatadepot.com/dem.
- Click on the link to http://gisdatadepot.com/dem

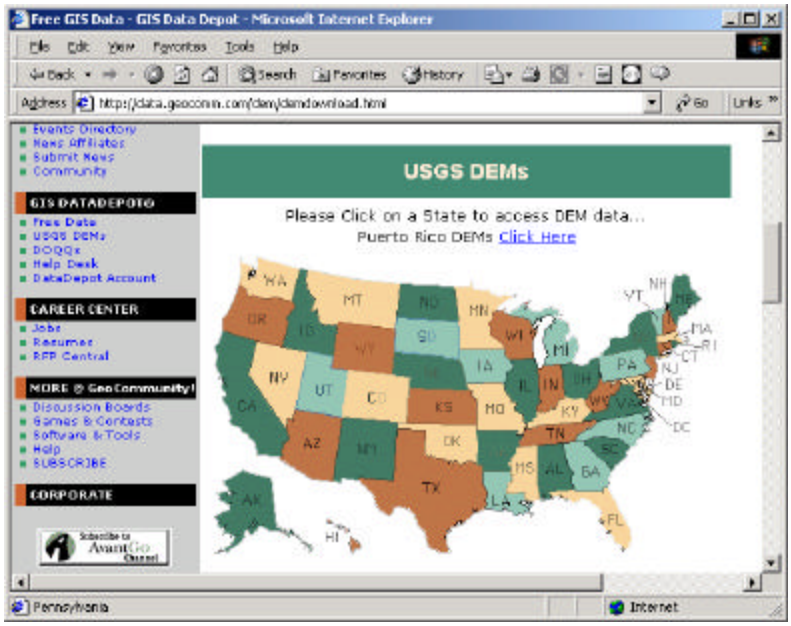


- You should now be at the following URL: http://data.geocomm.com/dem/

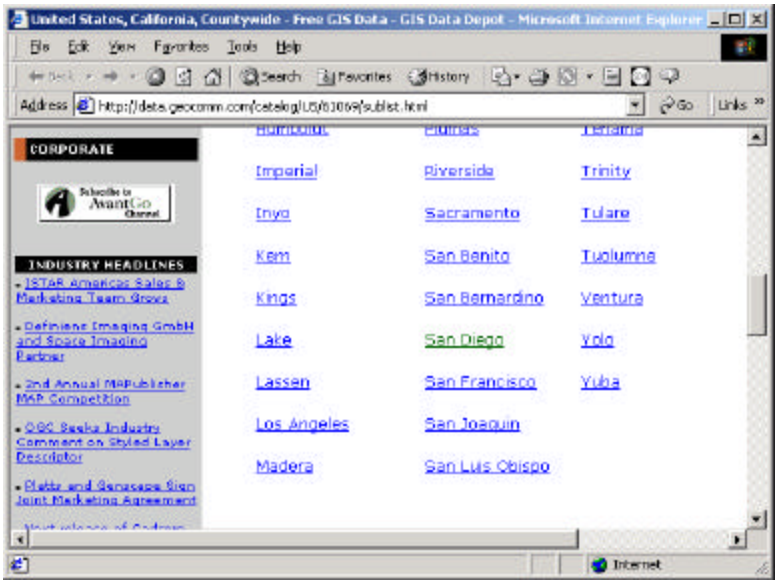
- Scroll down the page until you find the section shown below.
- Click on the link that says “DOWNLOAD DEM DATA HERE”



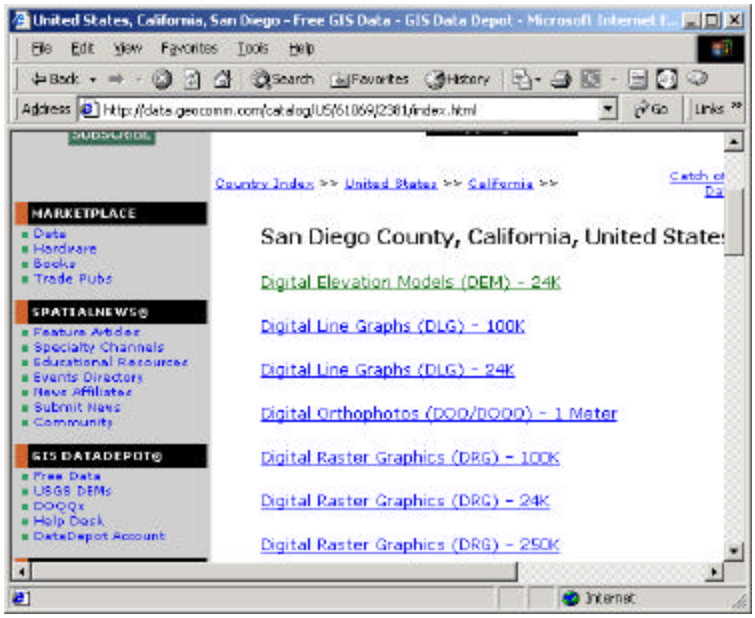
- You should now be at http://data.geocomm.com/dem/demdownload.html
- Scroll down the page till you see the U.S. Map
- Click on California



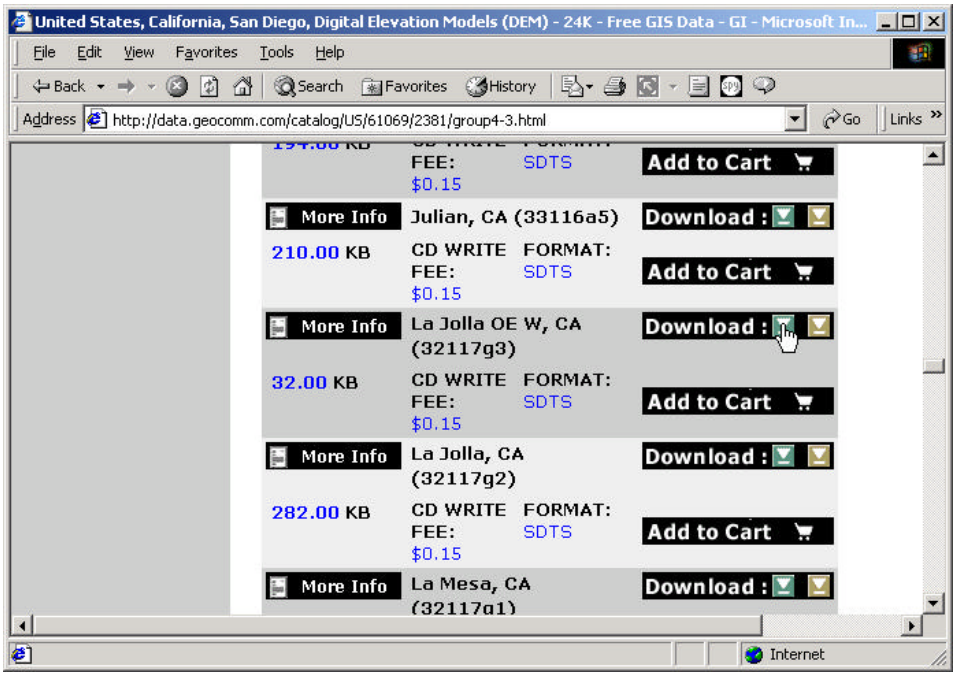
- Scroll down the page and click on the county, in this example it is San Diego



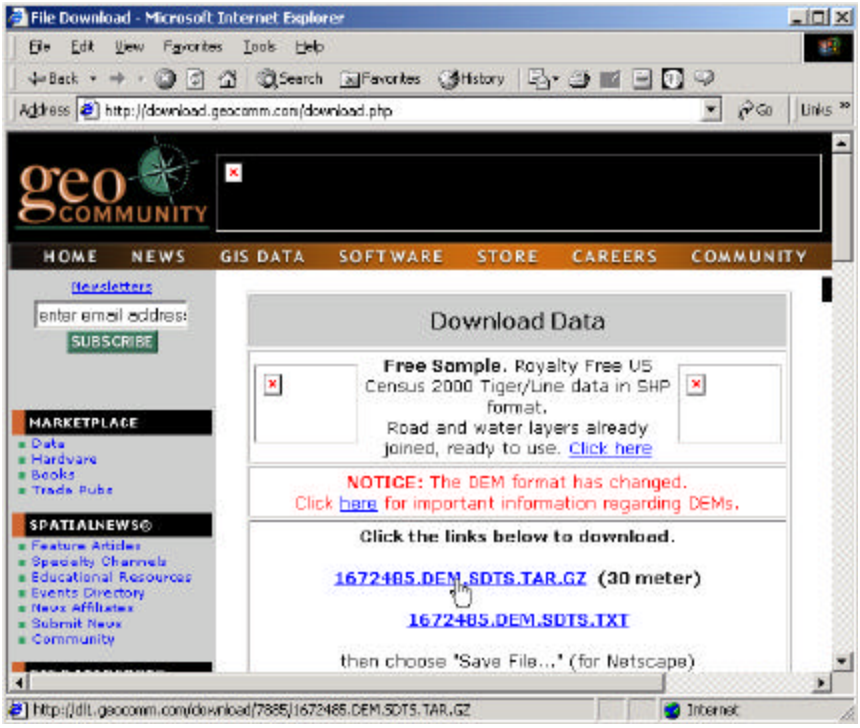
- Click on the link that says “Digital Elevation Models (DEM) – 24K”



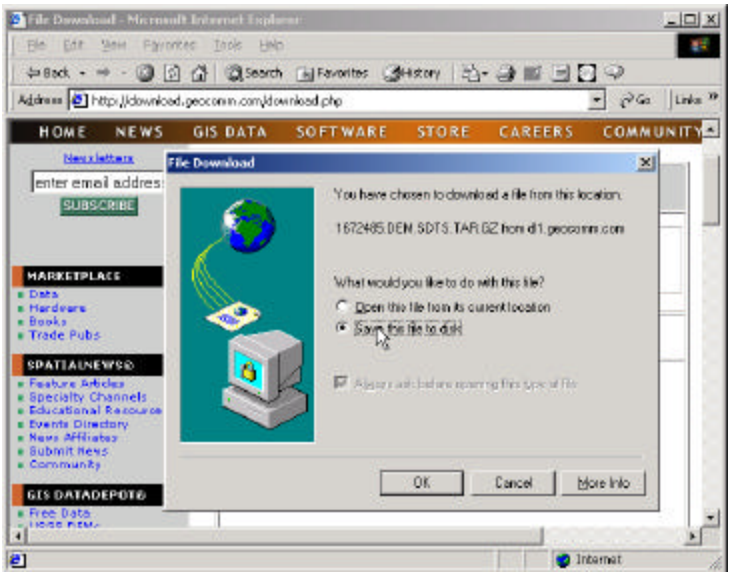
- You should see a long list of available DEM data files sorted by the name of the community (Note: in the previous version of the USGS web site you were able to select the local area by clicking on a map. Unfortunately you will now have to make an educated guess at the map name.)
- You may be asked to enter a user name and password. If you do not have one, you may create a new user account at no cost. Follow the on-screen instructions.
- Click on the green download button to the right of the map name as shown below. In this example, select La Jolla OE W, which is the western part of La Jolla.



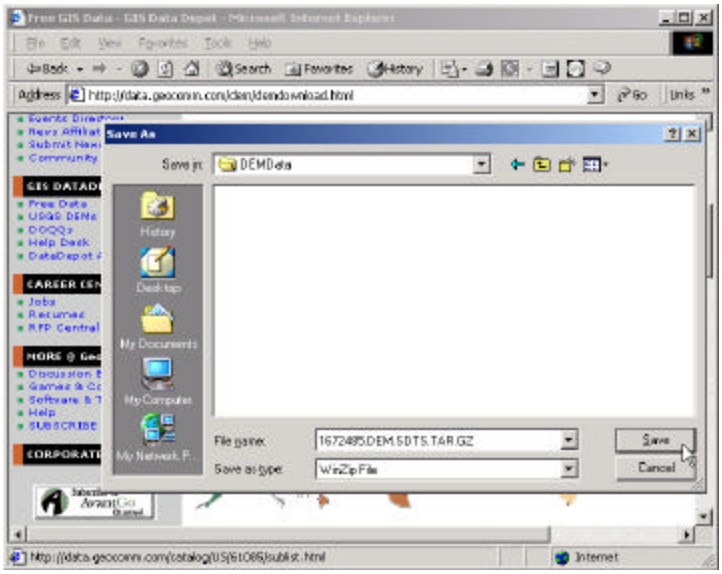
- You should see a screen similar to below. Click on the link to the zipped tar file having the GZ extension.



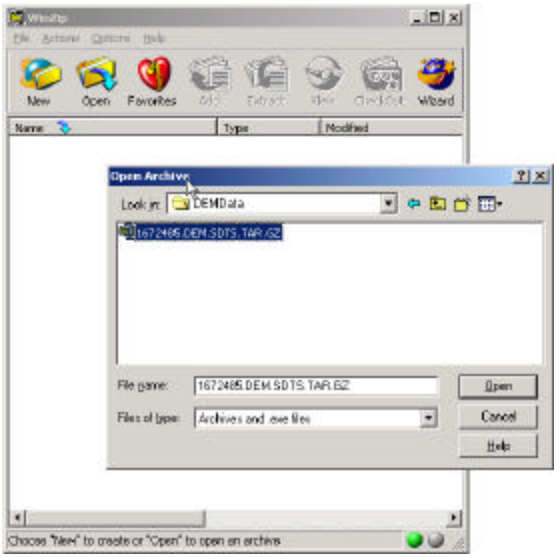
- You should see a File Download window. Select “Save this file to disk”, then press OK.



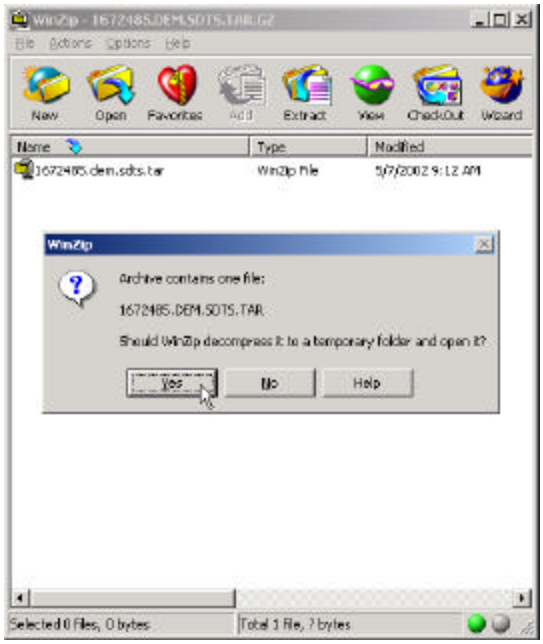
- Select the directory where you want to save the file on your local disk, then press Save.



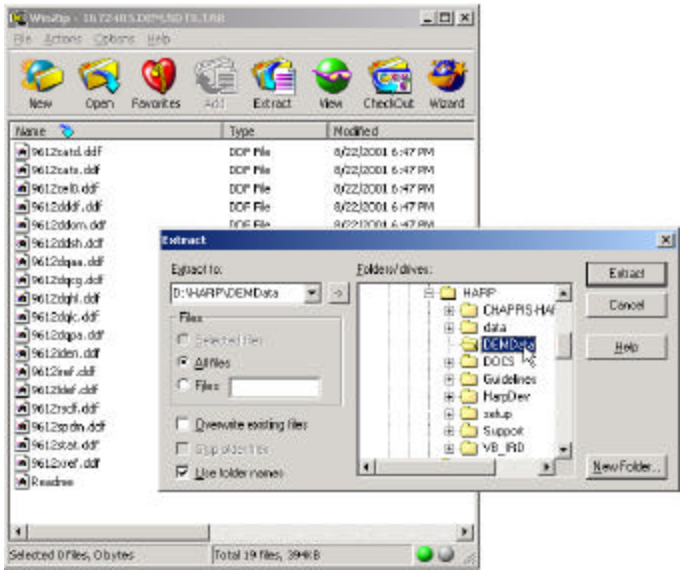
- The downloaded file in GZ (zipped) format.
- The GZ file must be unzipped; this will produce a Unix tar file. This can be done using Winzip.
- The tar file must be extracted to produce a set of files in SDTS format (Spatial Data Transfer System).
- The SDTS files must be converted to DEM (Digital Elevation Model) files.
- To acquire WinZip go to www.winzip.com. (At the time of this writing the cost is $29)
- Open the GZ file that you saved using WinZip.



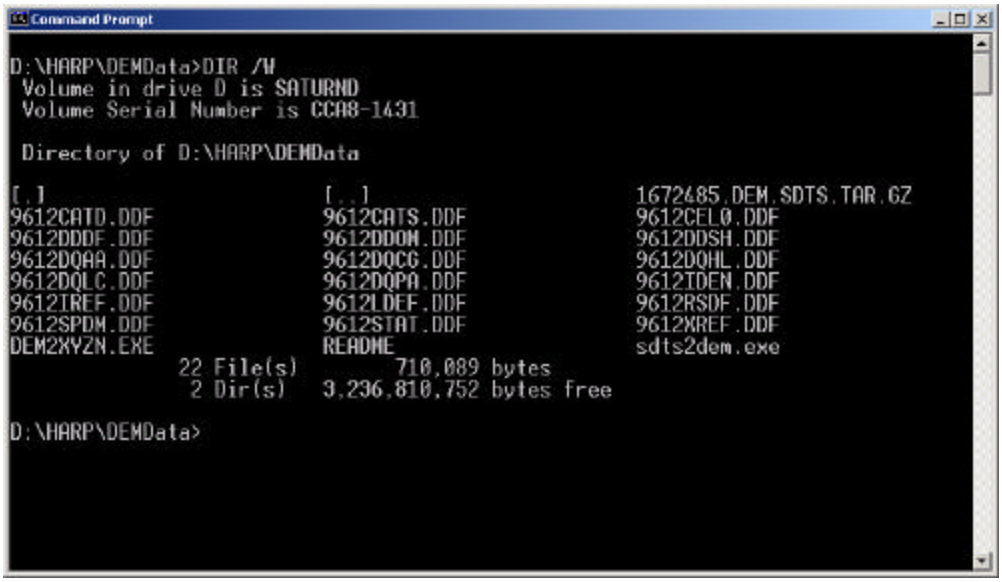
- WinZip identifies the tar file contained in the GZ file.
- When prompted click Yes to uncompress the GZ file to a tar file and then un-tar the tar file.



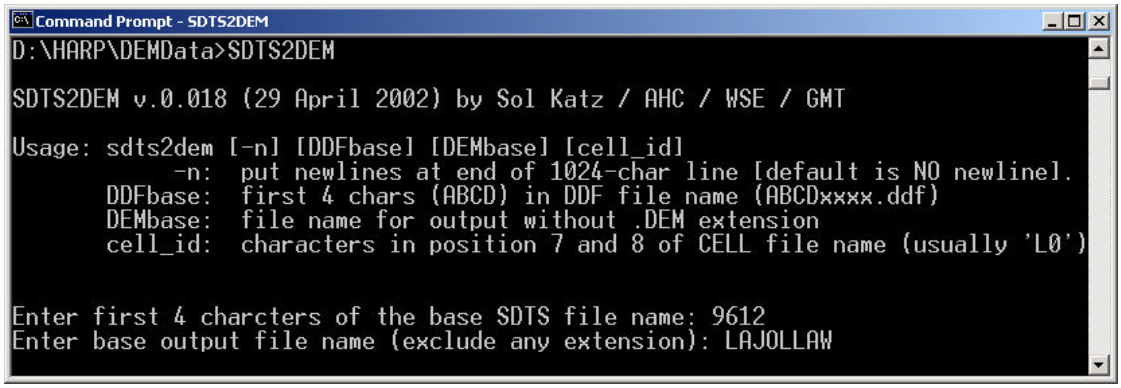
- Click the Extract button on the WinZip window.
- Select the directory where you want to place the extracted files.
- After the extraction, the directory will contain a set of .ddf files. These files contain the DEM data in the SDTS format (Spatial Data Transfer System).



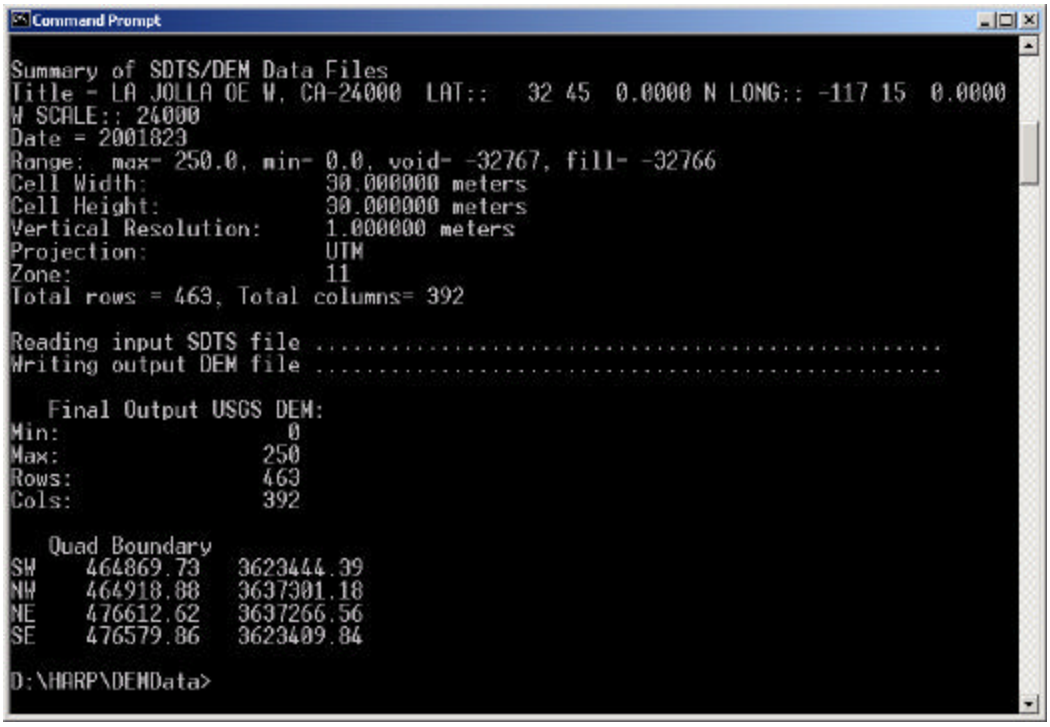
- You will need to copy one of the utility programs from the HARP directory to the directory where you have stored the DEM data (in the form of .ddf files)
- Copy SDTS2DEM.EXE to your data directory.
- Open a command window. First click the Windows Start button. Select Programs, then Accesssories, then Command Prompt
- At the command prompt use the CD command to change to directory where the data is saved
- In this example, first type D: to change to the D: disk drive
- Then type CD \HARP\DEMDATA to change to the data directory where I have chosen to put the downloaded data
- A directory list of your data directory should look like this:



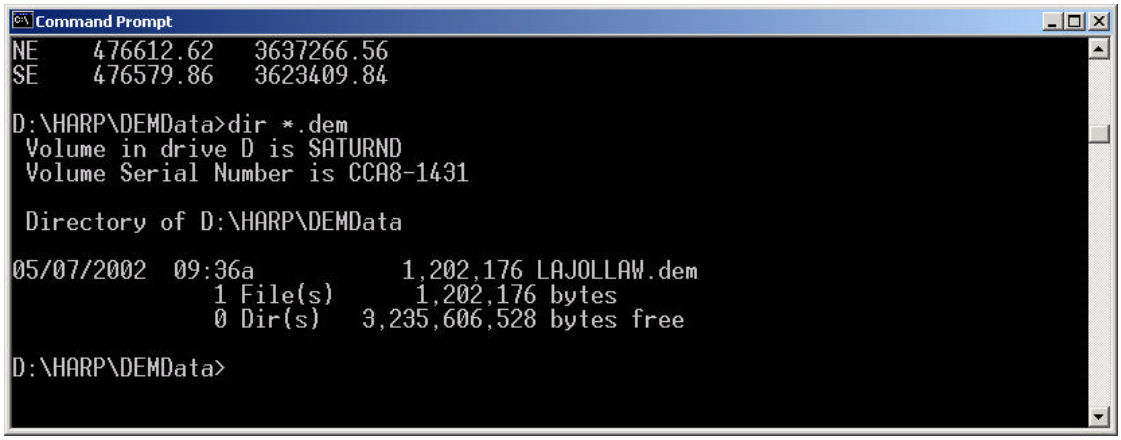
- Type SDTS2DEM
- When prompted type the first four characters of the .ddf file name, in this case 9612
- When prompted, enter the file name of the output file, without any extension. In this example, I have chosen to name the output file LAJOLLAW



- The screen output should look like this:



- Verify that the directory now contains a file called LAJOLLAW.DEM


Command Prompt
NE 476612.62 3637266.56
SE 476579.86 3623409.84
D:\HARP\DEMData>dir *.dem
Volume in drive D is SATURND
Volume Serial Number is CCA8-1431
Directory of D:\HARP\DEMData
05/07/2002 09:36a 1,202,176 LAJOLLAW.dem
1 File(s) 1,202,176 bytes
0 Dir(s) 3,235,606,528 bytes free
D:\HARP\DEMData>